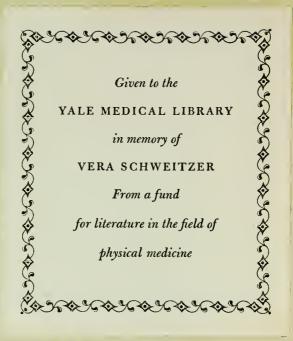
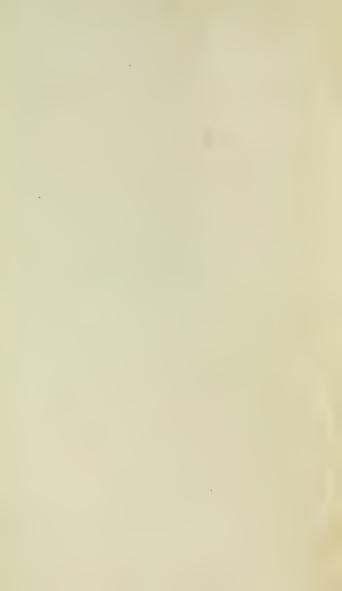
RA850 B7 842F DB PRANZ o n Mineral Waters.



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A Treatise

ON MINERAL WATERS,

WITH

PARTICULAR REFERENCE TO THOSE PREPARED

AT THE

ROYAL GERMAN SPA,

AT BRIGHTON.

"In otio sine cura bibe, Et spem fove salutis."

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"TREATISE ON THE EYE."

LONDON:

J. CHURCHILL, PRINCES STREET, SOHO—
BRIGHTON: W. LEPPARD, EAST STREET;
the principal Booksellers and Libraries; and also
at the Pump-room of the Royal
German Spa.

1842.



PREFACE.

It is a favorite prepossession, and a just one, in the British Islands, that an occasional residence by the seaside, has, generally speaking, a very beneficial influence on the health; in fact, he must be a bold man, who would venture to contravene an opinion, so deeply-rooted in every grade of society. What the seaside is to an Englishman, the numerous Spas, with which its surface is dotted, are to the inhabitant of the Continent. There,—more especially in countries possessing a considerable number of potent springs, as Germany for instance,—the people entertain a kind of

reverential regard for mineral waters, and have a faith in their great salutary powers, which is fully borne out by many irrefragable proofs.

This opinion concerning the efficacy of mineral waters, holds good on the continent, not only in respect to the community at large, but obtains equally with the medical faculty. Indeed I am convinced, there is no continental practitioner, who would hesitate to bear public evidence, as to the innate sanative power of these remedies, and the great, nay, sometimes marvellous effects they produce, in the treatment of chronic diseases; and who would not be able to substantiate his statements, by numerous cases from his own experience, as well as that of his professional brethren.

I myself have had the good fortune, to be personally acquainted with several continental physicians of great experience and high standing in the profession, with whom I had frequent conversations on the subject, all confirmatory of the above view,—I may mention the late Dr. Kreysig, who, in this

department of practice, was considered the first authority of his day. Further, having observed the effects of this class of remedies, under various circumstances and conditions, both in Dr. Struve's establishments, at Dresden, (where I saw the parent institution of this kind, spring up under Struve's personal direction) Leipsic, and Berlin, and likewise at the natural Spas most in voque in Germany,-I feel bound to offer my humble, yet earnest testimony, to the high and surpassing worth, both of the natural springs, and of Struve's imitations. The results produced in the treatment of diseases, by both descriptions of waters, have been found by myself, as well as by others, to be perfectly identical in a medical point of view; which, with the confirmation comparative analysis has afforded, undoubtedly justifiesus in deducing the conclusion, that the artificial waters are correct and faithful representatives of their prototypes,the natural mineral springs.

The object with which this little volume has

been written, renders it more incumbent on me, to make the public distinctly aware of the facts just mentioned; because, when travelling through Great Britain and Ireland, several years ago, and during my subsequent residence in this country, I have had frequent opportunities of becoming acquainted with the ideas, nearly universal, amongst non-professional persons, on this subject; and which, I may venture to say, are quite different from, and, in some points, directly opposite, to those prevailing on the continent. In regard to this, I have no doubt, that medical men, who know the opinions entertained in this country and abroad, about the natural and artificial waters, will fully agree with me.

This is certainly not the place, to argue upon the difference of these opinions; I may be allowed, however, to notice briefly, one which is very prevalent. It is common enough, to ascribe the benefit that may have been derived, from visiting, either a continental Spa, or one of this country,

almost entirely to the journey, change of air, mode of living, early rising, amusements and agreeable society of the place, &c. Now, no one would deny, that these circumstances, exert a favorable influence upon the constitution; and there is even little doubt, that health might be restored to many invalids, by such means, without having recourse to the waters at all; yet, in this respect, I perfectly agree with Dr. Granville, that, in the greater number of cases, these incidental matters, are entirely subordinate, and the use of the mineral water, the chief means of recovery. That this is the case, is proved by many patients being cured by mineral waters, without going to a Spa at all; and sometimes even, without being able; in the commencement, to leave their beds,

I trust this avant-propos will be excused by those, who are already aware of, and know how to appreciate, the virtue of mineral waters; it is addressed only to the many who say, "We have no faith in such remedies." At the same time, it will convey the reasons that have induced me, to comply with requests made to me, from time to time, to write a small work like the present; which I have rather reluctantly complied with, as, of late years, several publications, on the same subject, have been given to the world.

In composing the following pages, my chief object has been,—to furnish an outline of the history; and of the physical, chemical, and medicinal nature of mineral waters; and likewise to give some view of the relation in which they stand, to the healthy and to the disordered animal economy; to point out the maladies in which they are applicable, and the method, according to which, they ought to be employed internally; and finally, to lay down some rules, for the conduct necessary to be observed, by patients who use them. I have given, however, a more particular account of the operation, effects, and internal employment of those waters, which are prepared at the Royal German Spa, at Brighton.

The work is principally intended for general readers; but it may, perhaps, also convey a few useful hints, to those of the younger class of the medical profession, who are beginning to study the internal use of mineral waters. On this account, I have forborne to enter into arguments and hypotheses of any kind; and, in the plainest language I could choose, have merely endeavoured to exhibit the results I arrived at, by comparing the fruits of my own experience with the observations of others, as communicated to me either orally, or through their several works.

It is manifest, that, to compress a subject so ample as the one in hand, into a confined compass, must necessarily leave many deficiences, of which, therefore, I am well aware, the present volume is not devoid; but if it serves, in however small a degree, to direct public attention and enquiry, towards the subject treated of; or to modify the distrust that generally prevails in this country, concerning the virtue of mineral waters; my

purposed end will have been attained—nam admiratio pater, dubiumque mater, omnis scientiæ.

THE AUTHOR.

6, King's Road, Brighton, July, 28th, 1842.

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CHAPTER I.

HISTORICAL INTRODUCTION.

WE may reasonably infer that the religious rites of ablution and bathing, which have been observed by various nations, since the earliest periods of the world, were intended to be not merely typical of moral purity, but had also a distinct hygienic object. Although Hippocrates appears to have been the first who, in conformity with the doctrines laid down by Pythagoras, discovered the medicinal action of water in relation to its physical properties; and who, guided by the principles of the Asklepiades, of which sect he was an initiate, advised its external and internal use in various diseases; still, centuries before him, certain wells

were already renowned amongst the people of Greece, for their beneficial and sanative powers. The Greeks considered these springs as holy, and built temples in their vicinity, to which they performed pilgrimage. Such, for instance, was the well at Pergamus, dedicated to Esculapius.

The Romans had also their favourite miraculous springs, which were held in high esteem amongst them, and to which they resorted for the purpose of drinking and bathing. But with them the employment of water, as a remedial agent, was already more under the guidance of medical men. The great success with which Antonius Musa treated the Emperor Augustus, by advising him to drink copiously of aqueous fluids and to use the cold bath, is well known. Indeed the practice of bathing, became, amongst the Romans, a general object of fashion and luxury to such an extent, that wherever they carried their victorious arms, the most splendid baths were erected, of which numerous traces are still to be found in Britain, France, and Germany.

After the fall of the Roman empire, bathing was greatly neglected, and almost abandoned by the inhabitants of Europe for many centuries, only the very highest classes continuing the practice, and that to a much smaller extent. The Emperor

Charlemagne, for example, visited the baths of Aix-la-Chapelle once a year.

Bathing, however, gradually crept into vogue amongst the lower orders, especially the country people, who got into the habit of using some particular spring that had become popular in the vicinity of their habitations. The practice at length became again universally established, and was considered every where to be, not only necessary for the preservation of health, but a specific remedy against numerous diseases.

Some of these springs became famous for possessing miraculous powers, because they had proved more beneficial, and had more frequently effected a perfect cure of complaints, in which the baths, generally visited by the higher classes, had failed. This may, perhaps, have been owing to the circumstance of these springs being frequently situated in wild countries, and amongst woods-where only the bare necessaries of life were attainable; and where, consequently, all those irregularities of diet and living were out of the question; for which, the comfortable and luxurious baths of the wealthy, afforded ample inducement and opportunity. The miraculous efficacy which the people of that period, in their blind supersitition, assigned to certain wells, may, no doubt, in some measure, have given rise to those mystifications and puerilities indulged in, by professional men, during the subsequent centuries, in explanation of the innate properties of mineral waters; and which, in an altered and more scientific form, are still adhered to, even by some of the present day.

The external use of mineral waters, appears to have been, for a long time, the almost exclusive mode of employing them in the cure of diseases. At the commencement of the sixteenth century, however, the internal use of some springs again began to be recommended; yet the old practice of bathing continued to prevail, until the advantage and benefit to be derived from drinking the waters became more manifest by repeated instances of its success.

Since that time, neither mode of employing mineral waters has ever been neglected at the expense of the other. Both have gained largely in public estimation, and in the approval of the medical profession, in spite of various changes and revolutions in the systems of medicine. Physicians, however, of that and of the succeeding century, made use of mineral waters merely in an experimental or empiric manner. The science of Chemistry was then in its infancy, and, moreover, evidently labouring under a wrong tendency, viz.

towards a synthetic rather than analytic manner of investigation. The chemical examinations of such mineral waters were consequently, at that early period, insufficient to account for the extraordinary effects frequently produced by them. Physicians, therefore, judged of the cause, which was hid from their vision, by the effect they plainly saw, and, influenced by the prevailing popular notion, assigned, without scruple, miraculous power and properties to them, and endowed those properties with mysterious names, as "Mineral, and Wild Spirits," "The Spirit of the Spring," &c.

In the eighteenth century, mineral waters became more particularly an object of attention and enquiry, amongst medical men; who, assisted by the favourable progress that had been made in the sciences of physics and medicine, were now better able to throw some light on their chemical nature, and medicinal efficacy. Although the old notions about mysterious and miraculous powers were still adhered to, in a theoretical point of view; yet, in practice, the use of mineral springs was gradually delivered from rude empiricism, and more firmly based upon scientific principles.

At the end of the last, and at the beginning of the present century, many important discoveries, in physical science, materially contributed to unveil the hitherto mysterious nature of these waters. The advances made in chemistry, furnished proper means of analysing their complicated chemical constitution, and the progress in geological knowledge, led on to a more correct insight into the physical circumstances and conditions, under which they are prepared by the cunning hand of nature. At this stage of the question it followed, almost as a matter of course, that the idea of imitating the natural mineral waters, which had originated with that eminent natural philosopher and physician, Frederic Hoffmann, nearly one hundred years previously,-and which had subsequently heen the subject of many hut unsuccessful trials and experiments,-was revived in the minds of several able chemists, of whom, however, hut one succeeded in carrying it into execution with entire success. Of this gentleman's lahours I may here he allowed to give a short description.

Frederic Adolphus Struve, M.D. &c.—horn 1781, died 1840—was engaged in the year 1808 in making experiments on the preparation of hydrocyanic acid. Unfortunately the glass apparatus he was using hurst suddenly with such violence, that he was thrown on the floor in a state of insensibility. In consequence of this accident, a serious and obstinate disease was hrought on; for

the cure of which, he employed, with great benefit, the waters of Carlsbad and Marienbad. his stay at Marienbad, he made some experiments with the view of imitating the waters of these places for his own use, when he should return While further pursuing these experiments in his own house, he was led to the idea of imitating, not only those I have mentioned, but all the other mineral waters of Germany, which were then held in the highest repute for the cure of diseases. He commenced this great work, by numerous trials to ascertain the exact mode, by which the water was impregnated with gaseous and saline substances, in the great laboratory of the earth. He also examined the existing analyses of the various springs; and finding most of them inaccurate, personally visited the different Spas, in order to analyse the waters himself, immediately after they had been taken from the Well. When these preparatory researches were completed, he proceeded, in his chemical laboratory, to the second (and not less difficult) task of synthesis, or composition.

After having at length succeeded in preparing what he thought a perfect imitation of the original, he analysed his factitious waters, in order to compare them with the natural ones. The

test was successful, as, upon examination, they proved exactly similar. Having thus satisfied himself, that the factitious waters in his possession were, in a physical and chemical point of view, perfect fac-similes of the natural ones, he now thought it time to subject the result of his labours to the last and conclusive test, viz. to try what effect, their internal use would produce on the constitution. For this purpose his numerous professional friends were, in the year 1818, invited to his summer residence, where, in a large and pleasant garden, with his usual liberality, he dispensed, not only to his friends, but also to a great number of patients recommended by them, such of his factitious waters as their diseases seemed to require. His medical friends, who were, from experience, well acquainted with the action of the natural waters, took the greatest interest in this first trial, and watched most attentively and carefully, the immediate and the more remote effects of the manufactured oncs, both upon themselves and upon their patients. The result proved most satisfactory. Both in their mode of acting on the constitution, and in their power of curing diseases, Struve's factitious mineral waters, were thus found to be identical with the natural product of the carth.

After having been thus engaged in innumerable

experiments, of the most difficult and expensive kind, for nearly ten years, without intermission; Struve turned his attention to the construction of a mechanical apparatus, which would enable him to prepare and dispense the waters on an extensive scale. In the year 1820, he opened to the public, at Dresden, the first establishment of his manufactured mineral waters. The success, this met with, was so great, that, soon after, he founded another at Leipsic; in 1823, one at Berlin; one at Brighton* in 1825; and others since then at Konigsberg, Warsaw, Moscow, St. Petersburg, and Kiew.

Each of these establishments comprises two distinct departments. The first is the laboratory, in which the various salts and minerals are got ready and purified, the carbonic acid gas prepared, the common spring water distilled and freed from atmospheric air; and where, finally, these various component parts are combined in the relative proportions of the different mineral springs, which it is intended to imitate.

The second or dispensing department, includes an apparatus of a very complicated construction;

^{*}In this establishment are prepared sixteen of the most efficacious mineral waters of Germany, one of France, and one of America.

by means of which the factitious waters are kept beneath a constant and undeviating pressure of carbonic acid gas, and are maintained at the precise degree of temperature of their respective originals, until the moment when the fluid bubbles from the spout, in the pump-room, into the beaker of the invalid.

In the year 1824, Dr. Struve published the first, and, in 1826, the second volume of a Treatise on his factitious mineral waters, with numerous accounts of cases, in which they had been used, drawn up by some of the first physicians in Dresden, Leipsic, and Berlin; and all tending to establish the fact, that the medicinal efficacy of these waters, is precisely the same as that of the natural springs. About the same time, Dr. Kreysig of Dresden, -a veteran practitioner in medicine, who, during his long career, had directed his attention particularly to chronic diseases, and to their treatment by mineral waters, on the subject of which he was deemed the first authority of his day,-published his Treatise on the use of the natural and factitious mineral waters. In the preface to this work, he expresses himself thus: " I have

^{*} From the translation by Dr. Thomson and Mr. Bekenn. London, 1824.

observed, during three years, the most beneficial effects from these (Struve's) factitious mincral waters, on a vast number of patients, and twice experienced the greatest relief from the artificial Carlsbad waters myself. Nor do their effects differ in any way from those produced by the natural springs." The extraordinary degree of chemical exactness and accuracy, which Struve obtained in his compounds, has been firmly proved by analyses instituted by many able continental chemists, as well as by one of the first in this country, Professor Farraday, to whom Struve submitted a quantity of the waters for examination.

After this testimony, I need not quote any other authority, or record direct facts or cases, in illustration, and as additional proofs of the identity (both in a chemical and in a remedial sense) of Struve's artificial waters with the original springs. Nor shall I enquire here into the animated dispute which, the moment Struve's discovery became known, was commenced and carried on, for a long time, by the chemists and medical men in Germany. The difference is now generally adjusted, except on one or two points, which will be touched upon in the next chapter, when I come to speak of the nature of mineral waters. I cannot omit to mention, however, that the adverse party—which

comprised several physicians practising at the various Spas, and whose opinions could, on this account, hardly be expected to be unbiassed—could only combat the discovery of Struve, by reverting to ancient prejudice and hypothesis. This very controversy served to remove, from every impartial mind, any doubt, that might linger, concerning the uniform character of the two kinds of mineral waters; to confirm and strengthen the evidence already given in favor of their identity; and to extend the knowledge, together with the employment, both of the natural and of the artificial waters.

Yet, notwithstanding all this, there are persons, even at the present day, who ought to know better than to assert, that the natural mineral waters possess what they call "a mysterious thermality, a certain caloricity," not to be measured by Reaumur or Fahrenheit; or that there is present in these waters, "a subtle ather, a living property;" in fact, "a something, the nature of which we certainly do not know, nor can deduce from any known principle, and which is entirely wanting in the factitious waters." Again, it is asserted, that, in point of efficacy, artificial mineral waters resemble water in a kettle, wherein some common cathartic salt has been dissolved. It is argued that an imitation of wine is never so good as the real juice

of the grape; and that, as an artificial leg is infinitely worse than one of flesh and bone, even so must the factitious mineral waters be inferior to the natural. The absurdity of such modes of reasoning is too palpable, to require any remark, or any attempt at refutation on our part.

I cannot conclude this part of my subject, without pointing out some of the advantages which medical science, the physician, and the patient, have derived from Dr. Struve's important discovery.

1st. Although, at the time of Struve's invention, much had been done to rescue the employment of mineral waters from the empiricism of earlier times, they were still, in most instances, used at random, and frequently considered merely as the ultimum remedium in hopeless cases. But, by the study of their nature and properties, to which, as above-stated, Struve's discovery gave a great impulse, the indications, under which they ought to be used, became well-defined; their mode of operation better understood and explained on acknowledged physiological principles; and, lastly, mineral waters were introduced into the Materia Medica, where they now rank as sovereign remedies against a large number of diseases, and, moreover, as pre-eminently qualified to cure them, according to Asklepiade's injunction: "tuto, celeriter, et jucunde."

2nd. The distance of the various Spas from each other, formerly rendered it almost impossible for a physician to obtain a practical knowledge of more than one or two of them; but now, a few weeks' stay at one of Struve's establishments, will make him an eye-witness of the medicinal effects of most of the principal springs of Europe, and, at Brighton, of an American one besides.

3rd. In natural mineral waters, the proportion of the constituent parts, and consequently their power of action, varies in some degree as the season is wet or dry. This can never be the case with those of Struve, as, in his establishments, the waters are of course fac-similes of the natural Springs, at the season when the latter are in full perfection.

4th. At watering places, it sometimes happens that a patient discovers he has been originally directed to a Spa, which the resident physician finds not appropriate for his disease; and that he is put to great inconvenience and expense in leaving it for another Spa better suited to his case. This difficulty can never occur at Struve's establishments; for, where so many waters of varied character are collected on one spot, the patient

may be sure to find one that will suit his complaint, if at all fit for treatment by these means. Moreover, under proper medical advice, he may here change one water for another of a different degree, or different kind of action, just as his constitution or complaint may require it. He may also, by mixing one mineral water with another, modify their operation, or create an entirely new remedial tendency—an object of no small importance; yet not to be attained where no such establishment exists.

5th. Patients of this country, who are prevented by the nature of their complaints, by age, family affairs, business, insufficiency of means, &c. from undertaking a long journey abroad to the natural springs, have an opportunity of using, in their native land, the most efficacious mineral waters of other countries, in a state of full and perfect vigor.*

^{*} It is true that the cold waters may be had in bottles from the natural springs, but they always lose more or less of their virtue; and it is evident that the hot waters cannot be transported by any means. This partial loss of virtue is caused by the atmospheric air, with which the water comes in contact, 'during the bottling process; the oxygen of the air changes the protoxide of iron into peroxide of iron, which is insoluble in water. This partial decomposition is perfectly avoided by Struve's method of bottling. At some few of the springs in in Germany, Struve's plan of filling the bottles with carbonicacid gas previously to their being filled with the mineral water, is adopted, and is certainly a great improvement.

The advantanges I have enumerated are already enjoyed by various countries of Europe, and will no doubt, be in time reaped by the civilized nations of the other parts of the world.

CHAPTER II.

ON THE NATURE OF MINERAL WATERS IN A PHYSICAL, CHEMICAL, AND MEDICAL POINT OF VIEW.

Whatever may be the condition of the atmosphere in other respects, it always contains aqueous vapour, which is perpetually rising from the surface of our planet. This vapour is, by the influence of cold, condensed and precipitated in the form of dew, rain, &c. which, besides being collected in seas, rivers, and other natural reservoirs, is partly absorbed by the surface of the earth, and partly again evaporated.

Condensation of vapour, and absorption of water, take place more especially in highlands, and

on the cold summits of mountains; into the interior of which the water soaks, descending sometimes to a considerable depth until it encounters strata, by which it is compelled, either directly or after having been collected in large subterranean reservoirs, to move in another and generally in an upward direction. The water now either ascends by capillary attraction, or is forced, as it were, through fissures in the earth, in the manner of an artesian well; and thus makes its appearance again on the surface, but at a point somewhat below that at which the meteoric water was before embibed. The chief power that propels it through and out of the earth is hydrostatic pressure; by means of which, and by the succession of water from the atmosphere, the well is kept flowing. While the water is making its way through the bowels of the carth, sometimes travelling thus to a considerable distance, it decomposes more or less of the soil on its passage, and becomes impregnated with the soluble portions. On this account we nowhere find a well of any kind, that is perfectly free from foreign substances, volatile and solid; and which thus, as it were, impress upon the water the character or quality of the soil, through which it has filtered.

As, on account of the diminution of its density,

the temperature of the atmosphere decreases with distance from the surface of the earth, in an upward direction; so, in an inverse ratio, does the temperature of the earth increase, as approach is made towards its centre. The observations of many of the most eminent philosophers shew, that, in a flat country, beyond a point of from forty to one hundred and ten feet deep,—within which space changes of temperature, depending on the season of the year, can still be perceived—Fahrenheit's thermometer rises about two-and-a-half degrees with each penetration of one hundred feet, in a central direction.

Now, as the meteoric water, in travelling through the interior of the earth, dissolves a portion of the soil; so does it always assume that degree of temperature possessed by the soil through which it flows. There can, therefore, be little doubt, that the deeper the water descends towards the centre of the earth, the hotter it will become, and the hotter, of course, will the spring issue forth on the surface of the ground. A spring may, however, possess a considerable degree of heat, without rising from a proportionate depth, when the soil, the water passes through, is of a volcanic nature, and still retains a high degree of the heat of an earlier volcano, now extinct;

or when there is an active volcano in the neighbourhood, that imparts its subterranean heat beyond its own visible sphere.

Amongst the various theories of the origin of springs, which have been proposed since the time of Aristotle, the one here explained has had the most advocates. Respecting the source of thermal heat, philosophers are divided in their opinion: some advocate the theory of subterranean volcanic heat; others, that of the central heat of the globe. But, as there can be no doubt about the reality of the first, and since the second has received some strong additional proofs, by the boring of artesian Wells-of late, more especially that of Pariseither explanation, or both conjointly, may be made available to account for the elevated temperature of thermal mineral springs-so called when their temperature is above seventy-seven degrees of Fahrenheit.

Although there is, as I have just observed, nowhere on earth to be found a spring perfectly free from some admixture of volatile and solid substances—and every one therefore might be named a mineral spring—yet those only are properly so called, which contain these substances in a quantity sufficient to impart to the water a decided power of acting on the constitution as a

medicinal agent.* The quantity of substances contained in the mineral waters, however, marks only their difference from common water, but not their peculiarity as medicinal agents. This depends upon quality as well as quantity; the relative proportion and chemical composition of the ingredients; and likewise on the degree of temperature the water possesses. If the component substances are separated from the water, and from each other, they prove precisely similar to those kept in apothecaries' shops, and some of them are most commonly employed in the ordinary practice of medicine.

Whatever has been said about an extraordinary, organo-chemical mode of combination, and about the galvanic, electric, and magnetic properties of mineral waters, can only be considered hypothetical, in the present state of science; as hitherto, all experiments have entirely failed in bearing out the supposition, that their composition is any other than purely chemical; nor can the slightest trace of the above-named powers be actually discovered

^{*} It must here be mentioned, that there are a few springs used as remedial agents—as for example Gastein and Wildbad—which contain an exceedingly small quantity of gaseous and saline ingredients, and on this account are, strictly speaking, termed chemically indifferent springs.

in them. This applies likewise to the opinions which have been brought forward, that thermal heat is essentially different from common heat. A difference might just as well, and perhaps with more propriety, be said to exist between animal and artificial heat, which, however, is not the case, as in hatching eggs, for instance, both prove equally effective. The organic matter, and infusoria, found in the basins, and in the vicinity of thermal mineral springs, are produced after the water has been exposed for sometime to the atmospheric air, and to the influence of light, and has lost its temperature. These infusoria appear to be altogether extraneous to the water in its natural state, and are perfectly similar to those met with in all stagnant pools and even in rivers. They cannot, therefore, be considered as forming part of the integral ingredients, but rather as proofs of a corruption or vitiation of the water.

On the whole, we do not observe in the operation of mineral waters, anything so singular or extraordinary, as to oblige us to regard it as an organic fluid; or to suppose it endowed with a vital power, or any other imponderable agent, except caloric, or of elementary or other substances of material importance, which have not yet been discovered in its composition. The effects produced by mineral springs, in the cure of diseases, and the mode in which they were brought about, though once considered mysterious, may be accounted for in a sufficiently satisfactory manner, by the knowledge we have now obtained of their component parts, and also—a point of paramount importance—by the more rational manner in which they are used at the present day. I have now enumerated the most important arguments, alluded to in page 11, which have, of late years, been urged in opposition to Struve's factitious mineral waters.

In the following observations on the chemical nature of mineral waters, we shall take into consideration—first, the properties of the constituent parts, and the relation they bear towards each other; then the conditions on which the different nature of the various waters depend; and lastly, we shall point out, in what the remedial agency of mineral waters really consists.

Mineral water is composed of four general constituents: viz. water, caloric, gas, and various saline substances, which, in their combined state, re-act upon each other in various ways.

Pure water, being a combination of oxygen and hydrogen, is, in a chemical sense, a neutral fluid, and therefore an excellent medium for chemical processes. It absorbs and takes up with facility

gaseous and saline substances, which it dissolves thoroughly, and holds in solution. The caloric or principle of heat, enters into the closest and most intimate union with minerals and salts, in a less degree with water, and least of all with gas. It acts upon these substances by means of expan-In proportion, therefore, as temperature increases, solids become more and more liquefied, liquids vaporized, and gases volatilized. Accordingly, in conformity with this general physical law, cold water is best qualified to be abundantly impregnated with gas; but on the other hand, holds solid substances merely in a state of simple solution. Hot water, on the contrary, contains less gas, but is best adapted to melt or liquefy solids, and to combine and unite them more intimately with each other, and with itself; so that they form altogether a more uniform liquid. Carbonic 'acid gas, (of which alone I shall here speak, although mineral water contains small portions of several other gases,) is a combination of carbon and oxygen. It assists in dissolving some solid substances more perfectly, in combining them more intimately, and in holding them in complete solution. Cold waters, therefore, being impregnated with a much larger proportion of this gas than hot waters, it acts upon the solid and liquid substances they contain, in the same manner as a high temperature does in thermal springs.

A salt is a chemical composition, consisting of a basis and an acid; each of which is again composed of two elements; the first called the proximate—the latter, the remote constituent of salts. The combination of the remote, as well as proximate constituents, always takes place in certain proportion, and according to chemical affinity. The property of each salt results from its chemical composition, and depends, on one hand, on the nature of the basis, and on the other, on that of the acid: so that, for instance, the salts - of which Soda is the basis—possess, to a certain extent, a family character, belonging to the soda, with whatever acid this basis may happen to be combined. The same law holds good in respect to the acid: thus, the sulphates of soda, magnesia, &c. possess a certain similarity, resulting from the sulphuric acid. When several salts of different kinds are dissolved in pure water-as in the case of mineral springs, their latent properties are not only developed and rendered fit for operating, but a new chemical process is also occasioned, in which reciprocal action takes place. In whatever the said process may consist, this much appears to be certain,-that the medicinal property, peculiar to

each individual salt, is not lost or destroyed, but only modified, by the influence the various salts exert upon each other, whilst co-existing in solution. It would lead me too far to follow up this subject more fully; I shall, therefore, now only mention some of the constituents of mineral waters.

Those salts, the basis of which is composed of the following elements: viz. sodium, magnesium, calcium, or iron, and of which the acid is carbonic, sulphuric, hydrochloric; form the essential and predominant saline ingredients. Of subordinate or secondary value, are those which contain in their composition potassium, lithium, barium, strontium, aluminium, manganesium, iodine, bromine, fluor, silicium, phosphorus, &c. &c. In a pharmaceutical point of view the saline substances called essential, may be considered as the basis of mineral waters; all others, as adjuvants and correctives; and the water itself as the excipient or vehicle.

The different nature of the various mineral springs, results partly from the presence or total absence of one saline substance or another; and partly from the relative proportion of the salts, and their comparative bulk with that of the water. It is further dependant on the quantity of carbonic acid gas, and the degree of temperature. By a slight alteration in one or other of the points

in question, the nature of the water is entirely changed.

As the quality of the soil, from which the natural waters derive their gaseous and saline impregnations, and the conditions under which they receive their temperature, are hardly alike in any two instances, their chemical constitution must, of course, differ according to these circumstances; and thus it is, that so large a variety of mineral springs exists. And, moreover,-the supply of meteoric water, depending, in a great measure, on the change of seasons, and the interior of the earth being subject to convulsions, and other casual vicisitudes, which may change the quality of the soil, through which the water passes,-it is not to be wondered, that some greater or less alteration in the chemical constitution, and, consequently, medicinal efficacy of individual springs, should occasionally take place. That such alterations can never occur, with the waters prepared in Struve's establishments, I have already shewn at page 14.

The particular agency of a mineral water, is not exactly contained in the absolute preponderance, or special power of certain ingredients, although these points are of great importance; but, whatever the chemical constitution of the spring may be, its power of operation consists, principally, in the collective

action of its constituent parts, viz. water, caloric, gas, and the different salts; or, in a combination of the various properties and powers, of all the ingredients, into one great whole; in which, as Struve says, " no ingredient is unimportant, but even the smallest proportion of one, which may apparently be of no value, has its share in the entire action." If we, therefore, examine a mineral water with the agency of which we are not yet acquainted, and add together the properties of all the ingredients, it has been found, by chemical analysis, to contain; the sum total will certainly give us an idea of its general action: but its special medicinal efficacy, in the cure of certain diseases, can only be learned by repeated trials, and careful observation, of the effect the water in question produces on the constitution.

We now come to treat of the nature of mineral waters, in a medical point of view. To obtain a clear conception of this important part of our subject, however, it will be necessary to consider, previously, the relation in which each principal ingredient stands to organized matter; also, the action of each on the animal economy; and then, to point out the manner of collective action, in other words, the medicinal efficacy of mineral waters in general.

Water forms a principal and essential part of organized matter. According to Berzelius, water constitutes nearly four fifths of the weight of the human body.* It is the basis of the animal' fluids, and the medium for the formation of the solids, out of those fluids. It penetrates all structures, rendering them soft, flexible, and expansive. It conveys nutritive matter to every part of the body, depositing it where it is called for, and separating and removing those portions which are worn out. Water, therefore, renders organized matter susceptible of life, which it is also the medium of supporting; and it is even capable, unassisted, of sustaining vitality, not only in plants, but likewise in inferior animals, for a considerable length of time. It facilitates and equalizes the circulation of the blood and humours, through all the vessels of the body; thus exercising a most important influence, over the performance of every animal function. On account of its fluidity, mildness, and neutral property, pure water is best qualified to be

In illustration of this fact, I may be allowed to mention, that I saw at Blumenbach's museum, at Göttingen, the mummy of an adult, preserved with all the viscera, museles, &c. entire; which the celebrated physiologist, himself, assured me, was not quite seven and a half pounds in weight.

used by persons of all ages and temperaments, both as a hygienic and remedial agent. I shall, here, only mention its refrigerant, refreshing, diluting, dissolving, deobstruant, digestive, and exhilirating powers; which, however, with its other properties, are, in a great measure, dependant on its degree of temperature.

Water of a higher temperature than that of the human body (98 Fahr.), particularly when introduced into the stomach, increases animal heat: expands the fluids and the soft solids; accelerates the circulation, and promotes the functions of secretion and excretion, more especially the activity of the lungs, the kidneys, and the skin; the increased heat passing off, chiefly, by means of perspiration. The first exciting action, which lasts but a short time, has a deobstruant and resolvent influence upon animal matter; it promotes solidification of the blood, and liquefaction of the solids; the secondary effect, is a relaxed state of the body, and a mitigation of morbid irritability. Water of a lower temperature, than that of the body, on the other hand, detracts from the animal heat, in proportion as its temperature is low. The nerves of the parts with which the cold water comes first in contact, sustain a slight shock; the tissues contract, and the blood recoils. This state lasts but a very short time, and is followed by the secondary action, which is similar to the primary action of hot water, with the advantage only of being more permanent. The circulation now becomes more active, the natural standard of animal heat is elevated, the organic structure strengthened, and the nervous energy invigorated.

Carbonic acid gas, when brought into the stomach, in the same proportion as it exists in mineral water; quenches thirst, increases the secretion of gastric juice, and promotes digestion. It calms irritability of the stomach, if morbidly augmented, and, therefore, allays nervous vomiting. It improves the composition of the lymph and blood, in the same manner as vegetable acids; and has an antiseptic effect on ulcerating parts. It invigorates the vascular action, without increasing it. It regulates the secretion of the mucous membrane, which lines the intestinal canal; and, in some degree, also, that of the organs immediately connected with this canal. It gently promotes the function of the lungs, and of the skin; augments the quantity, and alters the quality, of the secretions, from the kidneys; and prevents the formation of certain calculous deposits in these organs. On the ganglionic, or organic nervous system, this gas acts as a slight stimulus, fortifying its energy; and, on the brain, it exerts, probably through the medium of the pneumogastric nerves, an influence, similar to that produced by spirituous liquors; but without their heating effects on the circulation.

Most of the remote constituents or elements, of which the salts, found in mineral water, are composed, likewise, form the rudimental constituents of the human body. Many of these salts are likewise contained in the animal and vegetable substances, which we use as our daily nutriment; and some of them, -as for instance, chloride of sodium, or kitchen salt, which is found in almost every mineral spring; and in several, in very considerable quantity,—are so much wanted, and consumed, by the animal economy, and are so necessary for its healthy condition, that we do not make one meal without them. The affinity which exists between the saline substances of mineral water, and the constituents of the body, and the impossibility of maintaining the animal economy, in a healthy state, without them; would shew, that the salts, especially as they are combined in mineral water, are rather to be regarded as alimentary means, of a peculiar kind, than as remedial agents. But, if they are to be considered in the latter light only, it must be admitted, that they stand in a

certain natural relation to the animal body, very different to other remedies from the mineral kingdom;—such as antimony, mercury, lead, silver, &c. which are totally foreign, and inimical to the animal frame.

The action of salt differs according to the largeness of the dose, and to the mode in which it is taken, as well as to its chemical composition. If used in a large dose, and moreover in a concentrated state, it acts on the stomach and intestinal tube, as a corrosive of greater or less activity; and hy over-exciting these parts deranges digestion. It likewise provokes copious secretions of the bowels, causing purging, and thus passes off, without entering into the blood. Its primary action is, therefore, merely confined to the primæ viæ. There are but few mineral waters, prepared in Struve's establishments, (Püllna being one) which operate in this manner. In the others the salts are of such kinds, and combined in such proportions, as to produce the following mode of operation. If they are taken in minute doses, and in a very diluted form, they greatly improve the digestive functions; they are absorbed and carried into the circulation, and hecome partly assimilated and animalized; thoroughly permeating the organic substance, where their peculiar power is developed,

in a mild, yet effective and permanent manner. The primary action, in this case, therefore, extends beyond the *primæ viæ*, over the whole circulating fluids; and has especial reference to the changes which organized or living matter is constantly undergoing.

It would embrace too many details to enter, here, into a full description of the medicinal property, peculiar to each salt contained in mineral water; but as some information, relative to it, may be expected in these pages, I shall just mention the characteristic features of the principal salts.

Soda has the most powerful influence on the composition of the lymph and blood, and consequently on the whole organized frame: its character is resolving and liquefying. Magnesia and lime, have a similar action, though in a smaller degree, and to a far less extent, but possess, at the same time, an absorbing and slightly tonic property. The essential properties of these bases, are most prominent in the carbonates, which, when met in the body, by another acid, suffer their carbonic acid to escape, and form new salts, whereby their nature is at once altered. They have also a specific relation to the urinary organs. In the sulphates, the essential property is more controlled by the acid: they act, according to circumstances, either

as a digestive, an antiplastic, or as a cooling purgative; having, moreover, specific reference to a plethoric state of the vessels, and glandular organs, situated in the abdomen. The chlorides hold, in respect of operation, rather a medium between the carbonates and sulphates, but besides, possess a specific action on the mucous membranes and the lymphatics. The iron, which is generally contained in mineral water as a protoxide held in solution, by the carbonic acid gas, is a most powerful tonic. Acting directly on the chylification and sanguification; it increases the red portion of the blood, the power of the vascular system, the irritability of the muscular fibre, and the tone of all soft structural parts. It exerts, likewise, its influence upon the ganglionic, or organic nervous system, and upon the abdominal plexus of the spinal nerves, increasing their vital energy.

All other saline substances contained in mineral water, accord, in general, with the action of the above four principal ones; they, however, modify, assist, and correct their operation in various ways. The action of *iodides* and *bromides* appears to be similar to that of chloride of sodium, having besides a specific relation to the glandular system. The aluminates and silicates appear to join in the action of iron; the first possessing, however, rather

an astringent, and the last a somewhat acrid property.

Having considered the individual nature of its principal ingredients, in a chemical and medical point of view; I shall now endeavour to give a general idea of the collective action, or medicinal efficacy, of mineral water, when used internally.

Mineral water, when taken into the stomach, actually undergoes the process of digestion itself; enters by absorption into the current of the circulation, and being partly assimilated, becomes, in some degree, an intrinsic part of the animal frame.

When mineral waters are used internally—in proper quantities, at regular intervals, and for a sufficient length of time—they correct, improve, and strengthen the whole of the digestive and nutritive functions. In the lymph and blood, they produce as Dr. Kreysig says "a kind of vital fermentation," i.e. an active process, which changes their mixture; resolves viscosities, stagnations, and obstructions of the fluids, and obdurations and indurations of the solids; disperses accumulations of morbid matter, internal tumors, &c.; neutralizes acidity and alkalinity; throws off the animal recrements and drosses, and separates and expels all unsound matter, from the more healthy mass, which, receiving at the same time, an addition of

genuine and vigorous substance, becomes thoroughly reformed, restored, and vivified. Further, the process of solidification of the blood, and liquefaction of the solids, is, according to circumstances, either diminished or increased; at all events this change is reduced to a normal condition. Since, however, the blood is only the substance of the body in a fluid state, and the body the solid blood, the same reforming and restoring process, which was originally effected in the blood, must extend, more or less, over all tissues and structures of the whole frame.

The main sphere of the operation of mineral water, is, as we may readily conceive from the foregoing observations, the lower or organic life; in which the action of the water causes a re-action, with a tendency to remove from the organized matter, the pathogenical causes which excite, weaken, or oppress the vital manifestations. If this desirable object is accomplished, the vital power of the organism is called into freer play, and gradually increased. This (vis naturæ medicatrix) of itself will bring back to a normal condition, the vital manifestations of the whole frame; re-establish the equilibrium of the animal economy; and cause it to act in harmony with the stimuli of the external world: a condition in which alone perfect health consists.

Such are, according to the opinions of the most eminent writers on the subject, and my own observation, the general effects of these powerful remedies, on the constitution; provided, they are used under proper indications, according to a judicious method, and in circumstances in other respects favorable. For without the fulfilment of these conditions, the use of mineral waters does not only not conduce to the end intended, but may cause very injurious, and even the most dangerous effects. I may here also mention, that the mode of their action is generally slow, gentle, and mild: although the re-action which they produce in the constitution, is in some instances, either at the commencement, or towards the termination of the course, accompanied by very violent, vet, in their tendency, harmless symptoms; which may perhaps alarm the patient, but which, being of the nature of a crisis, are constantly followed by a happy Yet, this final consummation does not result. always take place during the course, but occasionally, some time after the use of the water has been discontinued.

If we now ask the question; What is the general character of the operation of mineral water, in curing disease? it may be answered, that it is either, on the one hand, chiefly resolvent, or, on the

other, chiefly tonic: yet these are merely the two extremes, comprehending many nice gradations; whilst, in some springs, both characters are so intimately blended, that it is difficult to determine which predominates. In this case, they exhibit more of an alterative character,—which, it is true, belongs to each,—yet, is but seldom the most prominent feature in either.

Mineral waters are, therefore, in my opinion, chemical compounds, of a peculiar kind; prepared either in the great laboratory of Nature, -according to the general laws of physics and chemistry,or in the laboratory of art, in accordance with prescriptions derived from Nature, by chemical science. But the infinite Wisdom of this best of all physicians, has so dictated her prescriptions, that -while remedies, prescribed by medical men, from the shop of the apothecary, after removing the disease, for which they have been given, frequently leave the constitution only otherwise deranged,these compounds, curing by restoration, or regeneration, as it were, of the whole frame, leave it thoroughly and permanently improved and strengthened. They appear, moreover, calculated to remove, exactly, those local and constitutional derangements, to which mankind is most commonly subject; many of which, apparently of very different kinds, may, no doubt, be treated by the same water; yet, to cure each individual case, "tuto, celeriter, et jucunde," only a certain water can be best appropriated, and this it is the province of the physician to determine.

CHAPTER III.

ON THE INTERNAL USE OF THE MINERAL WATERS PREPARED AT THE ROYAL GERMAN SPA AT BRIGHTON, AND THE DISEASES IN WHICH THEIR EMPLOYMENT IS INDICATED.

Before entering into an exposition of the virtue of each individual mineral water, it will, I think, be neither misplaced, nor unnecessary, to make a few brief and general remarks, upon the lower or organic life in man; and also upon its deviations from a normal or healthy condition: for as this life is the chief sphere in which mineral waters operate, the

understanding of their proper and rational application in diseases, will be facilitated to non-professional readers, by one or two preliminary observations relative to it.

FIRST SECTION.

I .- Physiological observations on organic life.

It is a characteristic feature of the whole organized creation, especially of the higher animals, and man in particular, to generate out of itself and through itself, a peculiar activity or restlessness, to which, from its nature and object, the term vital has been applied. The sum of this instrinsic and manifold activity, is the vital power of the organization; and the condition necessary for the display of the vital power, is the contact of the organization with the external world. The extrinsic stimuli of this power, are light, temperature, atmostpheric air, water, and aliments; which act on the vital endowment of the organized matter, especially the nervous system,-termed the vegetative, organic, or ganglionic,-and upon the blood.

The blood is not only the matrix of the solids,

since out of it, all tissues, structures, in short, the whole frame, is produced and nourished; * but it is also an innate vital stimulus to the ganglionic nerves; which, on the other hand, govern the vascular, and, in fact, every other system and instrument of organic life; and endow organized parts with irritability, and, in a certain degree,

^{*} The blood is derived from two sources, viz. from the aliments by digestion, and from all parts of the body by absorption. The chyle and lymph, the results of both processes, are conveyed by the lymphatics, into the whole mass of the blood. A pure light red blood, is then propelled by the heart, through the arteries, into the capillary vessels. The capillaries, which inosculate on one band, with the arteries, and on the other, with the veins, constitute a microscopic net-work, which is distributed throughout every part of the body. Through the medium of these vessels, the blood performs all the phenomena of nutrition and secretion. While performing these offices, the arterial blood loses many of its materials, and a portion of its vitality; changing its light colour, into a deep brownish red; and has now become ill-adapted for the future purposes of life. From the capillaries, the dark blood enters the veins, through which, a great portion of it is conducted to the liver, where it undergoes an important depuratory process, the deteriorated matter being expelled in the shape of bile; and the whole, after having received a fresb supply, by means of the lymphatics, passes then through the lungs, where it is purified. more highly vitalized, and its dark colour changed, again, into light red. From the lungs it returns to the heart, as arterial blood, and the process of circulation now commences anew.

with sensibility. The blood and the ganglionic nerves are, therefore, the two intrinsic factors of what is named lower or organic life; which consists chiefly in digestion and assimilation, secretion and excretion. Sensation and voluntary motion, which constitute what is termed higher or animal life, are performed by the cerebro-spinal nervous system; which, being most intimately connected with the ganglionic system, links together organic and animal life; and, at the same time, is the medium through which the mind acts on the matter of its own tenement, and exerts an influence over the objects of the external world.

The vital power creates the organization, and endows it with vitality; and while it acts, the individual lives. As long as it is able to counteract the excitement, caused in the organization, by the external vital stimuli; the manifestations of life are accomplished under normal conditions; and the individual is in a state of health. If, on the other hand, there exists a disproportion between the vital stimuli and the vital power; the normal manifestations of life become disturbed; and disease supervenes. Lastly, if this power ceases to act, or if the living structure be entirely excluded from the action of extrinsic stimuli; the individual will shortly die: and when the power is totally extinct,

the organism is dead, and becomes reduced to inanimate matter. The vital power is, therefore, the generator, as well as the conservator of life; and in disease it will prove itself the healer (vis naturæ medicatrix), provided the encumbrances, which impede its free play, are removed.

II.—General doctrine of disturbance of organic life.

Disease, considered as an affection of life, or as a deviation of life from its normal condition, has always reference to power and matter; both being most intimately blended in the living organization. An organic disease cannot, therefore, exist, without some change in the vital power; nor a dynamic, or functional disease, in other words, a derangement of power, without causing alterations in the organized matter.

Disease is originated by bodily predisposition, and by an obnoxious cause acting at the same time upon the frame, It is true, that the predisposition may itself pass into a disease, or the cause alone may excite one; but in most cases, both concur, and each has its share in producing the deviation from a healthy state.

The grades and kinds of functional and material

derangement of organic life, are of course almost infinite, and extremely diversified. They depend principally, on the original conformation of the frame; on the constitution and temperament, whether hereditary or acquired; on the age, sex, habits, and vocation in life, &c.; on the nature of the obnoxious cause that acts; on the nature of the system, organ, or part of the frame acted upon; on the degree and kind of impression made; on individual predisposition to the invasion of a disease; on the degree of relation that exists between the exciting and predisposing causes; and on the extent to which the vital power of the individual is able to counteract the effect of the obnoxious cause.

If, on account, either of the peculiarity of the exciting cause, or of the state of the constitution, the ganglionic nervous system is primarily affected; the functions of those organs, which are governed by the ganglionic nerves,—digestion, circulation, secretion, &c.—must, at once, be more or less disordered; and, if this derangement lasts, the state of the blood, and other humours, will be changed; and, in time, alterations of the solid structures may take place. Some causes have a direct action on the blood, so, that its composition first becomes altered; but, as the blood is a vital

stimulus to the ganglionic nerves, these will soon be also affected; and then, disorders of the organic functions, and lesions of solid and fluid matter, will follow. The same phenomena take place, when a cause acts simultaneously upon blood and nervous substance.

Affections of organic life, if very severe and violent, or protracted, for a considerable time; extend their influence to animal life, and may occasion spasms or paralysis, of the locomotive organs; neuralgia, and various other affections of general sensation; deceptions of the senses; and derangement of the mind.

I shall, now, point out the principal modifications, of power and matter, in the animal frame, on which all deviations of organic life, from its normal condition, depend.

A .- Modifications of power.

- 1.—The energy of an organ, of a system, or of the whole frame itself, may be elevated above its healthy standard; this condition of life is termed excitation, and is one of the most frequent effects of external or internal causes.
- 2.—The energy may be depressed, below the medium grade of health; this condition is termed

debility, and originates in various ways. First, the whole frame, or a part of it, may be, more or less, deprived of its power; or, of what supplies it with power, viz. nourishment: this is called, primary, or direct debility. Again, if a part, or the whole system, continues, for a length of time, in a state of excitement; it becomes over-excited, and the vital energy is exhausted: this is secondary, or indirect debility. Lastly, the system may be wholly, or partially encumbered and oppressed, by vitiation of the blood, by congestion, by accumulations of morbid matter, by tumors, &c.—this is debility from oppression.

3.—The vital power, may have been, congenitally distributed to the various parts of the organization, in unequal proportions; or it may be in a state of fluctuation: and thus, while one organ, or system, in which it is for a time accumulated, as it were, becomes excited; another, related to the one affected, from being deprived of its due quantum of energy, falls into a state of debility. This condition may be termed, relative, or sympathetic excitement; or relative debility.

B .- Modifications of the blood.

1.—When the quantity of the blood is augmented, we call the condition plethora; when diminished,

anaemia. These opposite conditions, may give rise to a turgid, or pale and waxy appearance of the countenance; lassitude, drowsiness, dreamy unrefreshing sleep, head ache, vertigo, faintings; derangement of the digestive functions, and of the bowels; affections of the blood vessels, haemorrhage, morbid alterations of nutrition and secretion; visceral inflammation, congestion, and obstruction; nervousness, convulsions, spasms; and derangements of the senses, and of the mind.

2.—The quality of the blood may be variously changed. If it is dark, thick, viscid, redundant in fibrin,-a state generally found in plethora-it is then chiefly productive of visceral inflammations, congestions, obstructions; hysteria, and hypochondriasis, &c. If very bright, watery, and attenuated-as generally found in bloodless leucophlegmatic subjects-it occasions laxity, softness of the solids; ædema, serous effusions, discharges, &c. If of a decomposed, corrupt, contaminated nature, it becomes the source of numerous complaints: as fætor of the breath, or of the perspiration; derangement of digestion, nutrition, secretion, excretion; visceral inflammation, congestion, obstruction, enlargement, induration; adventitious growths; eruptive diseases; almost all sorts of nervous disorders: and derangements of the mind and senses. The

abnormal conditions of the blood, possessing a specific nature, are the scrofulous, tuberculous, rheumatic, gouty, calculous, syphilitic, scorbutic, cancerous, &c.; on which conditions, the corresponding diseases depend.

C.—Modifications of the functions of the vascular system.

1.—Any faulty state of the blood, together with disorders of the ganglionic nerves, change the vascular action, and the condition of the vessels themselves. Blood, which is too highly vitalized, gives rise to very active circulation; palpitations of the heart, lesions of the vessels, congestions, hemorrhages, inflammations, and fevers; to muscular and nervous excitement. The blood is generally found in this state, in voung and robust subjects, and frequently in those of a sanguine temperament. If the vitality of the blood is enfeebled,—which is mostly the case in the states of attenuation, decomposition, and some kinds of contamination of this fluid, and in anaemia,—the circulation becomes slow and torpid; and the coats of the vessels frequently lose their strength and elasticity; in consequence of which, their calibre is enlarged. This alteration of the vessels,—which, however, is

owing not only to the cause mentioned, but may originate under various circumstances-is principally met with in the veins, the coats of which are naturally thin, and more especially in those which have no valves, and are unsupported by muscles, as in the abdomen. Hence arise sluggish and imperfect abdominal circulation: functional and structural lesions of the stomach, the intestinal canal, the portal and hepatic system, the spleen, the uterine and urinary systems, &c.: all which local derangements of the abdominal viscera, may be again productive of various diseases, in distant parts of the frame—as for instance, the brain, the organs of the senses, the thoracic viscera, &c .- or they are accompanied by a multitude of constitutional disorders. This state of things is generally met with, in persons of a melancholic and choleric temperament, and of a cachetic habit, especially in middle and advanced age. In young individuals, on the other hand,-particularly those of phlegmatic temperament, and scrofulous diathesis,-the lymphatic vessels and glands are far more at fault than the veins, which, however-unless this state of the constitution is remedied, either by the employment of proper means, or the efforts of nature herself, as the age advances-begin to suffer more and more with increasing years; and at a later period of life, the above-named visceral derangements are apt to supervene; and moreover a predisposition to gout, gravel and stone, is usually formed.

In the note to page 43, it has been noticed, that the functions of secretion are performed by the capillary vessels. Now secretion takes place on open and on closed membranous surfaces; in the parenchyma of glandular organs; and in the areolae of the cellular substance: it is also influenced by the state of the vessels themselves; by that of the blood; and of the ganglionic nerves; and thus:

2.—The cutaneous exhalation may be increased or suppressed. It may possess a bad odour; be of a watery, oily, or glutinous kind; or the skin may assume a cold, livid, shrunken appearance, &c. The secretions, from the mucous and serous membranes, are likewise very frequently changed both in kind and degree—they may be too watery, or coagulable, &c. Hence the morbid discharges and fluxes, from the respiratory and intestinal passages, the bladder, &c.; effusions into the shut cavities, viz. water on the brain; within the chest and abdomen; or in individual organs situated in the two latter cavities; also within the capsules of the joints. The salivary, gastric, and pan-

creatic juices may be too serous or albuminous; too acid or alkaline; or of a bitter or rancid nature. The bile may also be too much attenuated; or too thick, fatty, resinous, &c. Such changes destroy, more or less, the digestive property of these juices, and render them injurious to the economy; and as, under such circumstances, no proper elimination of the deteriorated matter takes place in the liver, the blood is left in a more or less vitiated state. Hence fœtid breath, unpleasant taste in the mouth, want of appetite, bad digestion, nausea, heartburn, flatulence, diarrhœa or constipation; an itchy sensation over the whole surface of the body; and numerous other constitutional and local affections, both functional and structural. The very complicated fluid-secreted from the arterial blood, by the kidneys-is frequently changed, not only in the proportion of elements of which it is naturally composed, but it often contains materials entirely foreign to its nature. This condition is generally the consequence of lesions of the digestive and nutritive functions, and of the organo-chemical processes in the animal economy; and is not unfrequently productive of very serious affections of the brain, heart, vascular system; of structural alterations of the urinary organs; and of the formation of gravel and stone.

Lastly, alterations and suppressions of the menstrual and puerpural secretions, may give rise to an almost infinite number of local and constitutional maladies, of the most distressing and often serious kinds.

3.—The solid parts of the frame are variously altered, by modified interstitial secretion and absorption. Obesity or emaciation of the whole frame, and simple cnlargement or diminution in the bulk of a part of it, produced by mere excess or deficiency of nutrition, may certainly be considered as natural to some persons: but in others, these conditions of the body, are owing to faulty digestion and sanguification; to changes in the quantity and quality of the ingredients of the blood; or to a disproportion between the solidification of the blood, and the liquefaction of the Under these circumstances, the proper solids. condition of the solid structures, will in time be more or less morbidly altered. The skin becomes flaccid; the membranes loose, and deprived of their proper density; the coats of the vessels thin, and less elastic; the muscles flabby; the bones softened, and semi-flexible or brittle; the frame, either wholly or partially, loses its usual degree of flexibility, firmness, tone, and vital endurance and resistance. Laxity of the tissues may occasion infiltration of nutritive fluid, into the cellular substance, and produce oedema. If, in this case, the fluid afterwards undergoes a change, as to its consistence, the water being absorbed, and the albumen and fibrin condensed; or if the capillaries become clogged and obstructed, the structure of a part thus affected, is variously altered; obduration, enlargement, induration, softening, and ulceration, may take place.

Deficient nutrition, or increased absorption, may cause wasting of a part. Again, perverted nutrition may transform one tissue into another; for instance, the cellular into a mucus or fibrous; the latter into cartilagenous; and the cartilage may be changed into bone. Perverted nutrition may also occasion new products, adventitious to the organization; which arise, either from constitutional vice, -in which case they are often critical separations of morbid matter from the blood-or they may be dependant on local diseased action. Such are tumors, and collections of pus, fatty, or glue-like matter; deposits of saline ingredients, tuberculous and carcinomatous matter, &c. That such effects of modified nutrition, must again occasion numerous functional disorders, both local and constitutional, is too plain, I conceive, to require any further comment.

SECOND SECTION.

I.—The relations in which the individual mineral waters, under consideration, stand to organic life; the effects produced by them in anomalous conditions of this life; and particular indications for their internal use, in the treatment of diseases.

From what has been said in the previous chapter, it is, I think, evident, that mineral waters act directly on organized matter only. But as, by their action, matter becomes reformed and restored, so, in the same ratio, is the power regulated, invigorated, and fortified; and thus the vital manifestations are reduced to a normal condition. There is nothing in mineral waters, which can act directly on the cerebro-spinal nervous system, or its centres; and produce effects similar to those caused, for instance, by morphia, strychnia, camphor, musk, &c. The carbonic acid gas, has certainly some volatile influence on the brain; but this is only through the medium of the ganglionic nervous system, and the circulation; and consequently the effect is brought about in an indirect manner. It is, therefore, only by means of the organic life, and indeed from its very basis, that mineral waters can affect the animal life; and so bring about changes in the functions of locomotion and sensation, and in the mental manifestations.

It has likewise been noticed at page 38, that the operation of mineral waters, on the constitution, is slow, and generally mild and gentle. They require time to work through the fluids and the solids, in order to bring about the necessary alterations, and effectuate a proper condition, in the substance and power of the organization; but, however slowly they may operate, their action proves itself only the more scarching and efficient.

For a person in the enjoyment of health, pure spring water, taken in a suitable quantity, is the most appropriate drink to preserve it. None of the more powerful mineral waters, can be used by him, for any length of time, with impunity. He may, however, occasionally take, without fear, the waters of Seltzer, Fachingen, or Geilnau, as a pleasant refrigerant; or those of Seidschütz or Püllna, as a cooling aperient. Seltzer is far more to be recommended for this purpose than common soda water; and the Seidschütz and Püllna waters, are, in many instances, where aperients are required, preferable to common aperient salts, or rather, to the concentrated forms in which they are usually taken; and to the black draught, blue pill, &c.

It is, generally speaking, imprudent, and even dangerous, to use any of the more powerful springs, in order to prevent disease. If, however, the constitution be in a state of predisposition for certain maladies, which, we know, from experience, will sooner or later make their appearance; or, if their invasion is already indicated by symptoms that cannot be mistaken; or, if a person is labouring under a specific diathesis, especially the scrofulous, gouty, and calculous, although it may not yet have taken the form of actual disease: in these cases, mineral waters may be used with considerable advantage; either with the view of avoiding the threatened evil altogether, or at least of mitigating the severity of its advent.

Diseases characterized by an energetic re-action of the organization, against an affection of life, produced by an exciting cause; permit but a very limited application of mineral waters. Yet the use of some of them, is advantageous as an auxiliary to other remedies, in the treatment of acute cases, under the following circumstances:—if inflammatory fevers run a longer course than usual, and symptoms of great nervous depression or exhaustion, constitute their most prominent character, at a late stage; or if this character manifests itself from the very beginning of the disease (febris

nervosa, adynamica): further, if the fever is owing to irritations of the digestive or assimilative organs; to eutaneous eruptions; to organic lesion of structure (febris gastrica, exanthematica, hectica): lastly, if the fever is modified by a contaminated or decomposed state of the blood, and has a nervous character. (febris putrida, maligna.)

In these eases, the waters of Seltzer, used moderately as a common drink, assist the treatment eonsiderably; and especially when it becomes necessary to watch what efforts nature, herself, will make to relieve the system; or to provoke critieal secretions, from the mucous membrane of the air passages, lungs, and kidneys, by a mild resolvent or stimulant-the above-mentioned waters are of great benefit. In some eases of this kind, even a water of a slight tonic property, may be still more beneficial. If, however, the blood is highly plastic, or the vascular action is very powerful; if there is present great irritation of the lungs, or a high degree of mental disturbance, in the shape of stupor, with or without delirium; the use of mineral waters is not advisable in acute diseases.

The medicinal powers of mineral waters, can, on the other hand, hardly be parallelled by any known remedy; in fact, they are *the* sovereign remedies in those affections of life, that have been forming, by a slow process, perhaps for years, or even the greater part of existence; the true nature of which, is an alteration in the admixture and form of the organized matter, and in the state of the vital energy; which are characterized by local, or general debility, of a greater or less degree; and against which, the organization re-acts but feebly, or only under certain conditions. In short, in most of those maladies commonly termed *chronic*,—the principal forms of which, have been noticed in the first Section of this Chapter,—the use of mineral waters, may be considered of invaluable service.

The number of this class of diseases is indeed almost infinite. I can consequently mention them here, only in groups,—as, in a work of this confined nature, it would be obviously impossible, to enumerate each distinct variety. If, therefore, a patient should not happen to find his own individual case particularized; he need not, on that account, jump to the conclusion, that his complaint is not fit to be treated by mineral waters. Upon the authority of the physicians most skilled and experienced, in the cure of diseases by these means, and from my own observations; I can safely assure him, that, out of the great mass of maladies rooted in the organic life, there are comparatively very few, which may not

appropriately be treated by mineral waters; provided the disease has not made too great progress; a rational method of application is pursued; and the patient himself fulfils all rules, laid down for using the waters, with conscientious accuracy.

I must now refer the reader to what has been said from page 36, to the end of the foregoing chapter, about the nature and character of the general action of mineral waters; and as, in this respect, they have there been reduced to two distinct classes, viz. the resolvent, and the tonic; we shall now proceed to consider each individual spring, under the same heads.

FIRST CLASS-Springs possessing a resolvent virtue.

The main end aimed at, by the operation of the waters of this class, is to bring back the vital manifestations to their normal condition; by removing from the organization, vicious matter that impedes free action, by restraining power. They clear the apparatus of digestion and nutrition, of morbidly-accumulated substances; purify the lymph and blood from contamination, and discreumber the tissues and structures, of diseased matter. The circulation is rendered free, easy, and

uniform; and the due display of the vital power is no longer impeded.

They are indicated in functional disorders of digestion, assimilation, circulation, secretion, and excretion; produced by, and dependant on material vice: in a contaminated state of the blood; in obstructions and all ordinary forms of simple structural derangements, especially of the abdominal viscera; and if these diseases are accompanied by restraint and oppression, or even by a moderate degree of excitement of vital power; or are the effect of atony, or of a certain degree of torpor of the ganglionic nervous system. In affections of the brain, the lungs, and the heart; in indurations and enlargements of the more important organs of the abdomen; and in internal tumours; the use of these springs requires care and circumspection. if there is reasonable ground to expect, that the morbid structure may be reduced to its normal condition; perhaps no remedies can be better qualified to produce this change, than the resolvent springs, judiciously used. If, on the contrary, these organic lesions have advanced so far, as to approach softening or ulceration, or are of a malignant character; the employment of the waters in them, with very few exceptions, is dangerous.

I.—Springs acting especially on the venous system of the abdomen, and the primæ viæ.

A.—Waters in which the properties of sulphate of soda is predominant, in their collective agency.

1.—The thermal mineral waters of Karlsbad were discovered in the year 1370, by the Emperor Charles IV. They have ever maintained the first rank amongst mineral waters; and, indeed, they are unrivalled in efficacy. There are several springs at Karlsbad; the four most important of which, are prepared in Dr. Struve's establishments.

a .- Sprudel 165 deg. Fahrenheit.

b.-Neubrunnen 138 deg.

c.-Mühlbrunnen 128 dcg.

d.—Theresienbrunnen 122 deg.

These four thermal springs have the same kind of operation; but the degree of action varies, according to the temperature; and thus, each possesses a different medicinal efficacy. The hottest, is the most potent and exciting; and the coolest is the mildest; the other two, rank in this respect, between them. The cooler waters act more on the bowels than the hotter; and all four, are most powerful resolvents and alteratives; they have, moreover,

a peculiar expanding effect on the whole mass of blood. They free the prime via, from all long accumulated impurities; regulating and strengthening the whole digestive and assimilative process. They promote absorption and liquefaction, in the organized matter; augment the secretions and excretions from the liver, the intestinal canal, the kidneys, and the skin. They purify the blood from contaminations; improve its mixture; increase the vascular action; remedy sluggish and imperfect circulation in the abdominal viscera; resolve capillary and interstitial o'ostruction; and disperse enlargements, indurations, and new morbid products, especially of the liver, the spleen, the uterine system, the mesenteric glands, &c. They prevent the formation of calculous deposits; and expel gall-stones from the biliary bladder and passages, and gravel from the urinary organs.

Experience has fully proved the great remedial efficacy of these waters, in functional and structural derangements of the digestive and nutritive apparatus, and of the abdominal and pelvic viscera, (lesions of digestion, local plethora, obstructions, indurations, enlargements, tumors, gall-stones, gravel, and inveterate anomalies in the uterine system, &c.); in ordinary and some kinds of specific vices of the blood, (chronic rheumatism;

wandering, masked, latent, atonic, and chronic gout, without fever; lithiasis, and other dyscrasiæ; chronic cutaneous diseases and ulcers, &c.) symptomatic disorders of the nervous system, (hypochondriasis, hysteria, convulsions, spasm, St. Vitus' dance, catalepsy, neuralgia, paralysis, &c.) diseases of the senses, not idiopathic, (muscæ volitantes, amaurosis, &c.) in sympathetic derangement of the mind (spleen, melancholy, mania, &c.) and, in fact, in all those affections of the head and chest, and those constitutional complaints, which have their origin and growth in chronic disorders, of the abdominal viscera alone: for this, it must be well kept in mind, is the chief condition, under which diseases can be cured by the Karlsbad waters.

The use of these springs is, on the other hand, decidedly injurious in true or direct debility; in inflammations, and fevers; where there is a tendency to apoplexy, hemorrhage, or consumption, or the slightest suspicion of aneurism; in syphilis, scurvy, and dropsy, except when the latter has its origin in obstructions of the abdominal viscera; and in organic diseases, approaching to suppuration, or of a malignant kind. They may, however, be prescribed in small quantities, in a low degree of chronic inflammations, not affecting the general system, if the inflamed part be locally

treated with leeches, &c. In chronic diarrhæa; in all profuse secretions and excretions; in habitual congestion of the head or chest; and in a delicate state of constitution generally, the application of the Karlsbad water, requires the greatest carc and circumspection. In these cases, patients should undergo a preparatory course of treatment; and those of a robust or very plethoric habit, should previously lose a little blood. When a fracture of bone has occurred, these springs are not to be used within one year after the accident. Karlsbad, agrees best with phlegmatic, relaxed, atonic, and torpid subjects.

During a course of these waters, the bowels should be moved once or twice during the day; if this effect is not produced by the quantity of water drank, some Karlsbad salt may be added to the last beaker, or one or two glasses of the Seidchütz or Püllna waters, may occasionally be taken warm; or injections may be used to produce the desired effect. Sometimes, however, the bowels will be confined, in spite of the use of these, and other aperients; and this usually happens, when the action of the water is principally directed towards the kidneys, or the skin.

Generally the patient experiences but little inconvenience from using the Karlsbad waters;

and sometimes none at all; the disease abating gradually. In other cases, however, existing complaints become aggravated, or new ailments are added to them: as headache, giddiness, a sensation of lassitude, despondency, feverishness, nervousness; distention of the abdomen; pains in various parts of the body, especially in old wounds; active congestions, hemorrhoidal flux; temporary anomalies connected with the female constitution; oedematous swelling of the feet; cutaneous eruptions; and even a slight fit of jaundice, or gout, may be produced;—all signs of the operation of the water, which require watching.

Some of these complaints may make their appearance, in the beginning of the course; it is, however, not unfrequently the case, that, at about the end of the second week,—after its commencement; or, in some cases, it may be from two to six weeks after a discontinuance of the waters,—a kind of artificial disease is excited in the system. This is an important stage of the treatment; and if the efforts of nature are now energetically, yet judiciously attended to and assisted, a favorable change will, in all probability, take place. A considerable degree of fever, together with one or other of the above-named symptoms, will now be displayed; or more or less violent vomiting,

or diarrhœa, will simultaneously set in. This state of things must be considered as a salutary crisis; for, after it has subsided, the patient almost invariably feels exceedingly relieved; and is shortly afterwards restored to health. This revolution, caused by the waters, in the whole constitution, the Germans call very properly "a bath storm."

The patient should commence with one or two beakers of six ounces each, of Theresienbrunnen, or Mülhbrunnen: and encrease the number of beakers daily, by one or two, till he reaches, at the end of the first week, the maximum-which is from eight to twelve. He is then, in many instances, to exchange one or two beakers of his present water, for an equal quantity of the next in strength, continuing to do so daily, until the spring he began with, is entirely abandoned. Passing in this manner from one to another, he arrives at the Sprudel; which, on account of its high temperature, is to be swallowed in small draughts, or rather sipped. The duration of a course of these waters, is from four to eight weeks; but this, as well as the number of beakers to be drank, and the particular spring to be commenced and ended with, must depend entirely on the individual case; at all events, however, no patient should begin with the Sprudel, or even

with the next in temperature to it. During the last week of the course, the quantity of water taken, should be gradually diminished.

2.-The Kreuzbrunnen of Marienbad is a cold water, which, in its kind of efficacy, resembles in a great measure, that of Karlsbad. Its resolvent and alterative properties extend, however, less directly over the whole organized matter of the frame: and are more confined to the abdominal viscera. Being effectively aperient, it clears away all long-accumulated fæcal matter; augments the secretions from the surface of the intestines. pancreas, and especially from the liver; thus promoting the depuratory process of the blood. It imparts tone to the abdominal veins; and regulates their action, and the circulation, in particular, through the portal vein. It expands the blood less; has a more cooling effect upon it; accelerates the vascular action, and promotes the functions of the kidneys and skin less; and has a more tonic effect on the constitution, than Karlsbad.

This water is particularly beneficial in cases of dyspepsia, even when conjoined with some degree of gastric and intestinal irritation; in habitual costiveness; in general and local plethora; in laxity and varicose dilatation of, and languid circulation, and obstruction in the abdominal veins; in

a tendency to obesity, congestions of the head and chest, and hemorrhoidal fluxes. It is further indicated, in almost all the diseases already mentioned under the head of "Karlsbad," when it is not considered advisable to employ those spings, on account of their heating and exciting effects, which, by producing congestion, might prove dangerous. The Marienbad water may also be used with advantage; when the constitution is rather in a state of excitement than debility; even if some low degree of inflammation is actually present; and in a full habit of body; all these cases, however, require careful watching.

The contra-indications and precautions, are almost the same as with Karlsbad. It must be well considered, whether the constitution is able to bear frequent and copious alvine evacuations; and attention must be paid to the effects of the water, on the irritability of the system, and on the bowels; according to which, the quantity drank is to be regulated. In the course of a few days, the alvine evacuations generally become black, then change into a deep, or light green, or even yellow or whitish colour; and at last assume their natural appearance and consistence. But, although frequent and copious during the course, the evacuations should still not be watery; and as long as

they are of a soft consistence, will not weaken the patient; on the contrary, they will be critical, and attended with benefit to his state of health. By due attention to the bowels, and by taking now and then a tepid or warm bath, the sensation of oppression of the chest, and other constitutional complaints, which Marienbad is apt to produce, may be easily avoided. From two to eight or ten beakers may be taken daily; the course varying from three to six weeks.

3 and 4.—The cold waters of Seidschütz and Püllna resemble each other in their virtue, but are different in power. They differ also from all the other springs under consideration, in this respect-that their action has reference almost exclusively to the primæ viæ. They have a solvent effect on the mucus, bile, and old fæcal matters. accumulated in the bowels; powerfully excite the peristaltic action in the whole length of the intestinal canal, propelling its contents; and encreasing also the excretion from the liver and pancreas. They do not act as alteratives, unless in an indirect manner; their chief properties being cooling and purgative. If taken cold, they sometimes produce slight griping and spasms, which may be avoided by mixing them with a little Spudel, or warming them in any other way, and they will then agree with almost every constitution; with children as well as persons advanced in years. Püllna—the most powerful of the two—agrees, however, best with persons of an atonic constitution; and Seidschütz with irritable and hysteric subjects.

They may be taken with advantage, in all cases, where a mild and cooling purgative is required; they cannot, however, be used as curative, but merely as palliative or auxiliary means; for if their use were continued for any length of time, they would derange digestion, debilitate the alimentary canal, produce flatulency, &c. In catarrhal and rheumatic fevers and inflammations,-in which, sometimes, they render venesection superfluous,and in temporary disorders of the bowels, produced by an epidemic state of the atmosphere, full living, want of exercise, &c.; in congestions of the head and chest; in abdominal plethora, in habitual costiveness, &c. or during the use of some other spring: a dose of from four to twenty ounces, taken occasionally, acts very beneficially. They are also not unfrequently used, preparatory to a course of another water; but then they must be taken, in quantities of from four to eight or twelve ounces only in a day; and should not be continued longer than five or six days in succession.

The natural Kreuzbrunnen, and the last two

springs are very liable to be altered in their medieinal quality, by changes of the seasons, and by wet and dry weather; and are much deteriorated by transporting them in bottles. That such alterations cannot take place with the factitious water, prepared in Struve's establishments, has already been explained in the foregoing chapter.

II.—Springs acting especially on the lymphatic system, and on the mucous membranes.

B.—Waters in which the property of chloride of sodium is prevalent, in their collective agency.

5.—The Ragozi waters of Kissingen, (cold) rank, in respect of alterative and resolvent power, between Karlsbad and Marienbad; they excite and expand the blood less than the first, are more deobstruant than the last, and often prove more aperient than either. They rectify the quality, and increase the quantity, of the secretions from the mueous membranes; and remedy structural alterations of these membranes. They are more powerfully on the lymphatic system; and relieve sluggish and imperfect eirculation, and capillary obstructions, especially in the pelvic and abdominal viscera. They improve the admixture of the lymph; purify

and invigorate the blood; and slightly stimulate and fortify, the energy of the ganglionic nervous system.

They are very beneficial in dyspepsia, dependant on weakness, or a torpid condition of the digestive functions; in habitual eructations, nausea, and regurtigation of half-digested food; in vomiting; in cases where the bowels are in a relaxed state, and liable to accumulations of slime, bile, &c., and to the formation of worms: or in costiveness, alternating with diarrhea; further, in the scrofulous diathesis, and in all ordinary forms of what is termed simple scrofula, especially if conjoined with torpor. In sluggish and imperfect abdominal circulation; local plethora, obstruction, and structural derangement of the uterus and ovaria; of the spleen, pancreas, and liver; and in morbid products in the substance of these viscera; also in diseases of the urinary organs, especially of the bladder and prostrate, arising from catarrh, scrofula, or gout; in the calculous predisposition; lastly, in those affections of the head and chest, where the mucous membrane of the respiratory passages is deranged in function or structure, and its secretion suppressed, or too profuse, or changed in kind; in chronic catarrh, blennorrhœa, asthma, &c.; especially if co-existing with disorders of the abdominal viscera: in all these diseases, the employment of the Kissingen spring is indicated, and highly beneficial.

These waters agree best with phlegmatic and apathetic subjects, whose nervous sensibility is of a low degree. At first, they not unfrequently increase the symptoms of the complaint, and produce slight feverish attacks, which ought not to be neglected, as they may cause mischief, particularly in scrofulous persons; also in those suffering from a somewhat high degree of muscular irritability, and nervous excitement. Their use is not advisable in idiopathic diseases of the chest, especially scrofulous affections of the lungs; or when there exists much irritation of the stomach and bowels; nor in consumption, in dropsical, or scorbutic diseases. Number of beakers from two, to six or eight: duration of course, from four to six weeks.

C.—Waters in which the properties of iodide and bromide of sodium, together with the chloride of sodium are predominant, in the collective agency.

- 6.—The Adelheidsquelle of Heilbrunnen.
- 7 .- The Elisenbrunnen of Kreuznach.
- The Congress Spring of Saratoga, in America.

As the general virtue of these springs, is nearly

the same, I shall consider them under one head. They are cold waters, of a powerful resolvent, alterative, deobstruant, stimulant, and somewhat tonic property. The first is the most resolvent; the second the most tonic; and, in this respect, the third holds a middle place between them; approaching, moreover, in its general action, on the one hand to Kissingen, and on the other, to They operate chicfly on the lympliatic system, especially the lymphatic glands, and larger glandular organs; on the capillaries, the mucous membranes, and the skin; promoting powerfully the resorption of morbid matter, and regulating their respective functions. They improve the state of the lymph and blood; stimulate the vascular action; and invigorate the nervous energy. They increase the insensible perspiration of the skin; the exhalation from the lungs; and augment the secretions from the mucous membranes and the excretory organs.

These waters have proved their great power in counteracting the scrofulous diathesis; and have not unfrequently succeeded, in eradicating it entirely. They are serviceable in every form of developed scrofula; in indolent swellings of glandular organs, and of the cellular tissue; in slow and tedious inflammations, and alterations of texture in

the mucous membrane of the eyes, the cavity of the nose, mouth, in fact, of the membrane which lines the whole extent of the gastro-pulmonary surface, and the uropoetic and sexual systems. They are also eminently useful in cutaneous eruptions,* such as eczema, acne, porrigo, prurigo, herpes, lupus; and in scrofulous affections of the joints and bones. If judiciously employed, these waters are of great benefit, even in affections, owing to the formation of tuberculous deposits in the lungs; the mesenteric glands; the organs characterizing the female constitution; and in other structures and tissues; provided they are not too far advanced: likewise in visceral enlargement; internal tumors; irregular gout; chronic rheumatism; and in nervous disorders, when modified by a decidedly scrofulous constitution. Their use is also indicated in secondary symptoms of syphilis, when affecting the glands, or the skin; in hydrargyrosis; rickets; ossification of the soft solids; mucous discharges; in formation of serous and lymphatic effusions from rheumatism; in gouty

^{*}Soap, containing iodide and bromide of sodium and some iron, is very efficacious, when used externally, in various affections of the skin, especially those of a scrofulous kind. Soap of this kind has, at my recommendation, been prepared by Messrs. Brew and Co., 71, East Street, Brighton.

concretions; and in a predisposition to calculous diseases, when modified by a strumos habit.

The use of these springs, is contra-indicated, in ulceration of the mucous membranes, or of the substance of any of the viscera, especially the lungs; in dropsy and scurvy; in hectic habit of body; and in all diseases of an acute character. It requires great precaution and care in general plethora; in all cases where there exists, a considerable degree of vascular or nervous excitement; and in a hemorrhagic and apoplectic diathesis. When the stage of the disease, and the constitution of the patient have been well considered; the particular spring to be used, must be determined upon, with reference to its virtue; which has been pointed out above. Generally speaking, these waters are best borne by persons of a phlegmatic temperament, and torpid constitution; and when the disease has an atonic character.

Of the Adelheidsquelle and the Elisenbrunnen, from one, to four or five; and of the Congress spring, from two, to six or eight beakers, may be taken: the duration of the course, is from four to six weeks.

D.—Waters in which the properties of carbonates, especially of soda, are prevalent in their collective agency.

- 9.—The Grande Grille of Vichy, Dep. d'Allier, in France, 108 deg. Fahrenheit.
- 10 .- The Kesselbrunnen of Ems, 117 deg. Fahr.

Both are thermal mineral waters, and resemble each other in their virtue,-Viehy being the more powerful. They are alterative, resolvent, and absorbent; and the ealoric they contain, renders them very subtile and penetrative. They act principally on the lymphatics, and mucous membranes; chiefly of the respiratory organs, the uterine, and uropoetic system, and the skin; regulating their several functions. They promote and rectify the process, by which aliments are converted into chyle, and thus improve the state of the lymph; correct the admixture of the blood, and increase its fluidity. They also powerfully assist the process of liquefying the solids; and, in a certain sense, prevent the solidification of the blood. The insensible perspiration of the skin, and the exhalation from the respiratory passages and the lungs, and particularly the exeretions from the kidneys, are augmented by them; and if they act upon the bowels at all, it is rather to confine, than move them.

The use of these waters, is much to be recommended in irregularity of appetite and dyspepsy, dependant on weakness and morbid sensibility, or on a minor degree of irritation of the stomach; in acidity of the salivary, gastric and pancreatic secretions; in heartburn, flatulence, eructations, rumination; ejection of acid, acrid, or bitter fluids; also in all those constitutional affections, which arise from that particular crasis of the blood, where acrimony, or an abundance of albumen, or excretory matter is present.

The use of Ems, is preferable in a delicate habit of body; or when symptoms of the ordinary forms of simple scrofula are actually developed; and even in tuberculous affections of the air passages and lungs, if not too far advanced; also in chronic hoarseness, catarrh, blennorrhæa, and asthma; further, in functional and structural derangements of the uterine system; obstructions of the mesenteric glands; and in some cutaneous and nervous affections, dependant on scrofula. On account of its mildness of action, Ems is also preferable to Karlsbad, or Marienbad, in cases where these waters might be indicated, did not either the constitution of the patient, or the advanced stage of the disease, forbid their use. Ems is likewise frequently used, as preparative to the more powerful waters.

The waters of Vichy again, being of stronger

efficacy, will prove more decidedly advantageous, when some of the maladies just mentioned, are of rather long standing; and particularly if the patient's constitution and nervous system, are not too delicate or susceptible. But it is in morbid obesity; in acidity of the stomach; in acrimony of the blood; also in chronic rheumatism with effusions, that the waters of Vichy are chiefly beneficial: they are, however, of unrivalled benefit,-first, in regular gout, or gout of the joints; whether acute or chronic, hereditary or acquired; also in cases, where the internal viscera have been affected by a gouty paroxysm; or when gout is combined with calculous disease.* In acute and retrocedent gout, if symptoms of a violent inflammation or fever display themselves, they must, of course, be previously subdued by proper means; but a minor degree of febrile, or inflammatory

^{*} In a report on the mineral waters of Vichy, on the treatment of gout,—read by Mr. M. Patissier, on the 24th March, 1840, before the Academie Royal de Medicine at Paris,—Dr. Charles Petit, physician to that Spa, gives the several accounts of eighty cases of gout, treated under his direction by the Vichy waters. In thirty-four of these cases, the gont was hereditary; in forty-six, it was acquired; and in twenty, gravel was co-existent with the gout. After the use of these waters, no paroxysm appeared, for a number of years, in nineteen cases; they were rendered less frequent, shorter, and more devoid of pain, in fifty-one; and only in ten cases out of the eighty, the treatment was without success.

action, does not contra-indicate the use of these waters, if the stomach is in a condition to bear and digest them; yet even under such circumstances, great care and circumspection is still necessary. Secondly, they are of equal value in the lithic and phosphatic diathesis; or when calculous deposits of these two kinds have already been formed in the urinary organs.*

During the employment of these waters, proper attention must be paid to the bowels, which are

^{*} The experiments made by Messrs. Petit and Chevallier, have proved, that calculi of lithic acid, ammoniaco-magnesian phosphate, or the mixed phosphates, when immersed in the waters of Vichy, at a temperature of 96 deg. Fahrenheit, were completely dissolved in a few days; but that, comparatively, little impression was made upon the calculi, consisting of calcarcous phosphates alone, or of oxalate of lime.

These experiments were repeated in the year 1839, hy a commission, appointed by the Académie de Médecine, consisting of five medical men and chemists; and in the report to the Académie, M. Henry, the chief commissioner, says thus: "En résumant les faits qui découlent de ces experi-

ences, il résulte:

[&]quot;1.—Que l'eau minérale de Vichy, ainsi probablement que toutes les eaux alcalines gazeuses, agit d'une manière non douteuse sur les calculs des voies urinairies;

[&]quot;2.-Que les effets de l'eau minérale sur ces calculs consistent, non seulement dans la dissolution sensible de plusieurs principes de ces concrétions, mais encore dans la désagrégation de leurs ingrédiens, d'où résulte, d'une part, soit la diminution du volume de ces calculs, diminution qui peut ame-ner leur expulsion naturelle hors de la vessie par les urines; de l'antre, leur division, naturelle aussi, qui conduit aux mêmes résultats, ou enfin, leur plus grande friabilité qui fa-vorise singulièrement les efforts mécaniques de la lithotritie pour les réduire en poudre;

[&]quot;3,-Que les calculs mis directement en contact avec de l'eau

rather confined by their use, to prevent congestion of the head and febrile action, &c. The effect, which these waters frequently have, of producing copious secretions from the kidneys, may, in a great measure, be obviated, by promoting the cutaneous functions, by warm bathing and clothing. The rules of precaution, and the same contraindications detailed previously, when speaking of Karlsbad, hold good with respect to these waters also. The use of Vichy, is exceedingly prejudicial in all organic diseases of the kidneys, and of the more essential organs of life.

Of the waters of Vichy, from two, to four or five beakers may be taken, in the simple and recent affection, already alluded to; but in gouty and calculous diseases, the water taken, must be increased to a quantity sufficient to render the excretions from the kidneys, and even the cutaneous

de Vichy, et les fragmens rendus naturellement par des calculeux soumis à une certaine médication par cette eau minérale, offrent des traces évidentes de l'action dissolvante ou disgrégante de ce liquide, soit dans leur diminution en poids, ou dans les nouvelles formes qu'ils présentent."

Dr. Prout—Stomach and Urinary Diseases, Ed. iii. p. 458—says likewise: "Nor is the operation of such highly-carbonated waters confined to their mcre solvent effects; they undoubtedly possess disintegrating powers—that is, powers of disturbing the attraction, both cohesive and adhesive, by which the molecules of calculi are held together, so as to render them brittle and easily broken into fragments."

perspiration decidedly alkaline; which effect is, in the majority of cases, produced by taking from five to twenty-five beakers, in twenty-four hours. In these cases, the course is likewise prolonged for a length of time, and occasionally repeated. Of the Ems waters, from four, to eight or ten beakers may be used. The duration of the course, for the first, is from three to five; and for the last, from four, to six or eight weeks.

The medicinal properties of these four waters, are very analogous to those of Ems; their action, however, is less exciting, more cooling; slightly aperient, and altogether milder. Obersalzbrunnen is the most potent of the four, and is therefore more frequently employed as a curative agent, than the other three. In general, their use is advisable in those maladies, for which Ems is indicated; but when that water cannot be prescribed, on account of a too excitable state of the patient's nervous and vascular system; or if the disease has too much of a sub-inflammatory nature, or is in an advanced stage. In scrofulous affections of the

air passages and lungs; of the uterine and urinary organs; of the mesenteric glands; and of the skin; when tuberculous deposits have been formed, and are in a state verging to that of incipient softening, and in profuse mucous discharges, from any part of the pulmo-gastric surface;—the action of Obersaltzbrunnen, more especially when taken with milk or whey, has frequently proved most salutary, even in cases when only a fatal termination of the disease had been expected.

Seltzer quenches thirst most effectually, refreshing and invigorating both body and mind; properties which are rendered still more agreeable, by mixing with it a little Hock and sugar; it may therefore now and then, be taken by persons in good health. As a dietetic, it is greatly to be recommended to those, who are subject to acidity or morbid sensibility of the stomach; indigestion, dependant on weakness of the stomach; scanty secretion of urine; slimy alvine discharges; nervous or muscular irritability; and profuse perspiration. Its advantages in assisting the treatment of acute and protracted fevers, have already been hinted at in page 58. It possesses, likewise, great value, as a preparatory or auxiliary means, in the employment of all those springs; the action of which, as has been stated, is chiefly directed

towards the lymphatic system, and the mucous membranes. It is used, in this respect, in cases where it seems required to promote critical secretions from the mucous membranes, skin, or kidneys. In dropsy (anasarca) without fever; in astlima; and in incipient pulmonary consumption, Seltzer has often produced the most favorable results. If used regularly in small quantities, for months or years; and if the general mode of living is, at the same time, properly regulated; the scrofulous diathesis in children, will be considerably ameliorated, or entirely eradicated. On account of its mildness of action, and being very digestible, Seltzer agrees well with young children, and females of the most delicate constitution. Should it, however, have occasionally an exciting effect, either some of the carbonic acid gas may be allowed to escape, or it may be mixed with milk before it is drank.

What has been said of Seltzer, applies equally to Fachingen and Geilnau; the use of which is however, more especially to be commended in acidity of the stomach; in acrimony of the blood; in hypochondriasis; and in the calculous diathesis. Both these waters powerfully augment the secretions from the kidneys—the former more so than the latter. When local harm is to be feared from

irritation of these organs, Geilnau is preferable.

Of Obersaltzbrunnen, from four to eight beakers may be used, and the course continued to four or six weeks; and longer if taken with milk. In what quantity, and for what length of time, the three other springs should be taken, must depend entirely on the circumstances under which they are used, and the effects they produce on the constitution, and on the disease. They may be taken daily for months, and even for years.

SECOND CLASS.—Springs possessing a tonic virtue.

The mineral waters of this class tend to bring back the vital manifestations to their normal condition; by directly introducing into the circulating fluid, materials capable of endowing the organization, with genuine power; provided an absolute deficiency of it, is the cause of the anomalous action of the vital functions. They improve the state of the lymph and blood; increase the plasticity of the arterial blood, and the energy of the vascular system; augment the cohesion and firmness of all soft tissues and structures; regulate and strengthen the functions which are actuated by the organic nerves; elevate and fortify the irritability and sensibility; and thus restore vital resistance and endurance to the frame, and vigor to the mind.

They are indicated in all complaints produced by, or dependant on, an impoverished state of the blood, and an absolute deficiency of nervous energy, viz. true or direct debility; in secondary or indirect debility; also in debility from oppression, provided the cause, whether mental or material, which had exhausted or oppressed the vital energy, has been entirely removed; further, in some cases of sympathetic or relative debility [vide page 48]; and lastly, in certain cases of torpor, in the ganglionic nervous system.

Their use is contra-indicated in all those cases, where the blood is either rich in fibrin, or encumbered with impurities; in local and general plethora, where there is energetic vascular action, with a tendency towards the head or chest; in lesions of the solids of every kind and form; in a predisposition to inflammatory or hectic fever, active hemorrhage, and apoplexy.* The waters of this class are all cold.

^{*} Patients have generally very incorrect ideas coucerning strength and strengthening agents. Feeling weak and feeble, they, perhaps naturally, think that a nourishing diet, tonies, &c. will restore their lost vigour; but these means, unless true, or direct debility is present, will not only not strengthen them, but will decidedly tend to make matters worse. Strength of the animal economy, is that condition, in which the vital functions are performed, in a proper manner, with energy, and steady continuance of action and power. Strengthening means,

III.—Springs acting especially on the arterial system, and on the irritable fibre and structures.

E.—Chalybeates, or waters, in which the properties of steel or iron are predominant, in their collective agency.

15.—The waters of *Pyrmont* appear to have been used as remedial agents, even so far back as the time

therefore, are those which reduce the vital functions, if disordered, to their normal state; and every thing that deranges them still more, must of course, invariably prove deleterious. Bark, steel, wine, blood-letting, &c., a fullor low diet, and even fasting, are therefore means, each of which is capable of introducing strength, as well as weakness, into the system; hut whether the one or other effect will be produced, depends entirely on the circumstances under which they are used

The following case will perhaps make this plainer.

Mrs. H. of London, aged thirty-four, having suffered considerahly from hemorrhage, during parturition, was ordered a strengthening regimen; yet, so far from being invigorated by it, her strength continued to fail rapidly, notwithstanding a gradual increase of the nourishing diet. When I was called in, the fourth week after delivery, she complained chiefly of an excessive degree of weakness and exhaustion. She was hardly able to speak, and could neither turn in bed, nor raise her head from the pillow, without assistance; she sank also, in the course of twenty-four hours, into several fits of deep syncope, each of which lasted for an hour or upwards. I ordered a large quantity of leeches to the abdomen, which were afterwards several times repeated, in a smaller number; prescribing, at the same time, medicines that would have enfeebled any person in health; and for diet, she was only allowed weak tea, and a mouthful or two of bread; and this only when she should ask for it. Under this mode of treatment she perfectly recovered. Upon subsequently meeting with her, she said to me, "It is singular that when taking wine, porter, meat, &c., my debility should have increased more and more; while by losing blood, and being reduced to a bread and water diet. I regained my strength."

4

of Charlemagne; at all events, like Karlsbad, they have for many centuries, enjoyed the very highest reputation. In books of an old date, we find this spring called "fons sacer;" and, indeed, if the infusion of youthful warmth and vigour, into a rigid and worn-out frame, be something "divine," this epithet is certainly not misapplied.

The waters of Pyrmont are of great tonic power, which has a direct relation to the blood. nature of the arterial blood is rendered more genuine; it becomes more highly vitalized; and its plasticity, and the tone of the structures built from it, increased. In the same ratio as the blood becomes arterialized, and adapted to the process of solidification, it loses its venous character, and its proneness to the opposite process of liquefaction. The blood, likewise, recovers its peculiar influence as an intrinsic vital stimulus, to the ganglionic nerves; and thus, -aided by the immediate action of the carbonic acid gas, with which this spring is so richly impregnated,—augments and vivifies the nervous energy: the result of all which, is strength and invigoration of the functions, appertaining to organic and animal life. Pyrmont has, besides, an exciting action on the kidneys, increasing their secretions. It likewise exercises a slightly aperient effect on the bowels.

The use of this water, is indicated in debility, occasioned by insufficient food, or the too speedy consumption of nutrimental materials, as in young people growing, or during puberty; by an extensive loss of blood, or other noble bumours; or by violent, or continued bodily or mental excitement. It is recommended, likewise, in torpor of the ganglionic nervous system; and in local debility of any organ, viscus, system of the frame, that has been caused by over-excitation; provided the exciting cause has been removed, and no lesion of the fluids or solids is present. Under such circumstances, its use is especially beneficial, in weakness of the digestive and assimilative apparatus, of the sensual, sexual and uropoetic organs; and the constitution generally. In dyspepsia, habitual vomiting, protracted alvine fluxes, tendency to the formation of worms; passive hæmorrhage, especially from the uterus, or intestines, and the hæmorrhaidal vessels; mucous discharges, chlorosis, certain cases of scurvy; hypochondriasis, hysteria, vertigo, head-ache; convulsion, spasm, neuralgia, paralysis; purely nervous weakness of sight, and amaurosis, &c.; in fact, in all diseases, proceeding from, or dependant on the various kinds of debility, above specified.

It must be borne in mind, however, that Pyrmont

is prejudicial in the diseases just mentioned, when they are produced by, or are dependant on, an impure state of the blood; structural lesions of the solids; or accumulations of morbid matter, &c; in short, on debility, from oppression of the vital energy; unless the oppressing cause has been effectually removed from the organization. For the other contra-indications, see the general remarks on the Chalybeates.

As it is often very difficult, and sometimes almost impossible, to make out clearly, and at once, a case exactly appropriate for treatment, by so potent a water as Pyrmont; it will be always more advisable, under such circumstances, to begin the course, with a water of less tonic property. To prevent and mitigate congestions of the head and chest; convulsions, spasm, feverishness, and other slight temporary complaints, which this water is often apt to occasion; it is requisite to keep the bowels regularly open, every day, if necessary, by taking some of the aperient waters, (Seidchütz or Püllna,) or by using injections. these precautions are neglected, some one of the above inconveniences will certainly follow; in which case it may become necessary to discontinue the water, for a day or two, altogether; to take cooling and soothing medicine; or even to have

some blood abstracted. If the water causes uneasiness of the stomach, or vomiting, it is best to take only a small quantity at a time, which may be mixed with some hot milk; to let some of the gas escape before drinking it; or to drink a small cup of coffce without milk, half-an-hour previous to the first beaker. These waters agree best with persons of phlegmatic temperament, of lax fibre, and atonic habit of body.

From two, to six or eight beakers, may be taken every day, for about four or six weeks, or longer.

16.—The *Pouhon* of *Spa*, is nearly as tonic as Pyrmont, but milder in its operation, less exciting, and more digestible; it promotes the functions of the skin and kidneys, rather than those of the bowels, which frequently become confined, during its use. On the whole, the action, indications, contra-indications, and precautions, are the same with reference to this water, as to the foregoing one. It is, however, preferable to Pyrmont, in cases, where there is a considerable degree of local weakness of the stomach and intestinal canal; if the muscular fibre is very irritable; the nervous system in a state of high sensibility; and the vascular system easily excited, and liable to irregular action; also in convalescence, from severe

inflammations, and fever; small pox, &c. The number of beakers to be taken, and the duration of the course, are the same as with Pyrmont.

17.—The Ferdinandsbrunnen of Auschowitz. The tonic virtue, is certainly the most prevailing quality of these waters, yet they approximate in some measure, to the resolvent waters being slightly alterative, deobstruant, and aperient. They are used with advantage in all cases, in which the Chalybeates are generally indicated; but more especially, when obstructions of the abdominal viscera, are threatened; or when they have already been actually in a slight degree formed; and are the effect, either of general or local true debility, or torpidity of the ganglionic nervous system. The precautions, number of beakers, and duration of the course; are the same as with the two former waters.

18.—The Franzenbrunnen of Eger, ranks, in respect of its medicinal properties and action, between the resolvent and tonic springs, and more particularly between the waters of Marienbad and Spa. Its use is therefore advisable in local plethora, or visceral obstructions of a minor degree, and short standing; if they co-exist with, or rather are the effect of, a weak or torpid state of the ganglionic nerves, and of the nervous

plexuses of the abdomen; or if they are combined with a deficieut, feeble, or decomposed state of the blood, or with some degree of scurvy; provided more serious and inveterate structural derangements are totally absent. Again, it may be prescribed in cases, in which the purely-resolvent waters might be indicated; but where the increased secretions and excretions, always more or less produced by these waters, cannot well be borne by the patient, on account of a generally debilitated state of frame; or where the debility is conjoined with a high degree of nervous irritability. Under such circumstances it is more recommendable to use the Eger water, at least as a preparative to the resolvent spring; although the latter may at first seem better adapted to answer the intended purpose.

The contra-indications and precautions, pointed out, when speaking of Marienbad and Spa, apply also to Eger. The number of beakers of this spring is from four to eight; and the course may last from four, to six or eight weeks.

II.—A few general remarks on the proper method of selecting and administering mineral waters, in a given case.

We have sometimes been told by medical men, as well as patients, that mineral waters certainly possess a power which is capable of producing great effects; but that we cannot account for the manner, in which these effects are produced. It is unnecessary here, to make any further remark upon the inherent power of these springs, having already, I think, sufficiently analysed this part of my subject, to convey some idea of what it con-Anything, however, that may still remain, to make their action appear mysterious, and the effects produced by them miraculous, will, no doubt find a satisfactory explanation, in the methodus adhibendi. The great, and indeed marvellous cures, which men like Drs. Becher, Marcard, Kreysig, Diel, &c. have accomplished by means of mineral waters; if the properties of the waters themselves were merely taken into considerationwould certainly in many cases, remain a problem, capable only of solution, by a knowledge of the sound discrimination, and unerring sagacity, with which these eminent practitioners, have used them as remedial agents.

As a judicious and rational method of employing curative means, is a point of great importance, in the healing art in general; so does it become, for many reasons, particularly desirable, in the treatment of chronic diseases by mineral waters. To prescribe them with success, it is, therefore, not

sufficient to be only superficially acquainted with their general action, but we must possess a thorough knowledge of the specific effects, characterizing the collective action of every spring, within our reach; not only with reference to diseases, but also to the state of every variety of constitution and temperament. The disease must be investigated in all its relations: as to its cause, nature, character, stage, intensity, and duration; whether it is in a state of remission, exacerbation, &c. It is indispensable, likewise, to consider fully, the original conformation of the patient; the idiosyncracy and diathesis, and whether they are hereditary or acquired; the state of the brain, heart, and vascular system in general; previous disorders, and the traces they may have left; the age, sex, profession, habits of life, &c. . and finally, the influence, that change of climate, residence, society, customs, and regimen, to which, on account of using the mineral waters, the patient may be obliged to submit, will exert on his state of body and mind.

After the above circumstances have been taken iuto careful consideration, a spring, corresponding exactly to the peculiarity of the disease, and the individual mental and bodily, constitution of the patient before us, is to be decided upon, and selected for

use. It is not sufficient to fulfil the general indications only, and to choose either a resolvent, or tonic water; but as certain waters, whether resolvent or tonic, are best qualified for certain cases, we must endeavour to discover the proper relation, existing between the water, the disease, and the constitution, and then determine upon the one, which seems most appropriate for the given case. Further, the particular nature of the case, and the symptoms produced in the disease and constitution, during the use of the waters, should be kept well in mind; in the event of its becoming requisite to change one water for another; or to modify the operation, by mixing one kind with another.

Before the patient begins the course, it will sometimes be advantageous to prepare his stomach so as to enable it, when otherwise quite empty, to bear a large quantity of liquid; and if it appears that there are gross impurities accumulated in the bowels, some of the Seidschütz or Püllna waters, or injections, may be used for a few days, previous to the course. Plethoric subjects ought to be bled, at least, if a water is to be used, which has a decidedly exciting effect on the vascular system, and which expands the mass of the blood. If the patient is of a delicate habit of bedy, or suffers from muscular, vascular, or nervous

excitement; it is always safer to commence with a water of a low degree of power, (if a cold one it should be warmed) and then to exchange it by degrees, for one of greater strength. A small quantity of the water is to be taken at first, which may be increased gradually, every day, until the maximum is reached; and this will be best determined by the digestive power of the stomach; the degree of excitement, caused in the vascular and nervous system, by the water; and by the frequency, copiousness, and nature of the cutaneous, urinary, and especially the alvine excretions.

Where the state of the health requires it, or when the water is not well borne by the stomach, it may be mixed with some milk, whey, or weak and plain broth; and in some cases, a small cup of coffee, without milk, or cocoa, may be taken, half-an-hour or an hour before the first beaker of water. If the cold of the water is offensive to the stomach, it may be tempered with hot milk, or by mixing it with some Sprudel. If the Carbonic acid gas, produces head-ache, vertigo, or any other uneasiness, or acts too powerfully on the kidneys, it will be well to let some escape, or to stir it out with a spoon, before drinking the water, and to prolong the interval between every two beakers; but, in general, it is always better to take the

water, with the integral quantity of gas. If irritation of the brain, or kidneys is produced; or diarrhæa caused; the functions of the skin ought to he promoted by warm hathing and clothing. When the water has a binding effect on the bowels, some Karlsbad salt may be added to it; or it may be mixed with a sufficient quantity of a simple purgative water. This may be done every day, if required; but, notwithstanding this, should no action follow, a dose of warm Püllna may he taken; or injections with common or salt water, used occasionally. When the case requires that the water should act rather as a tonic, some of a Chalybeate may be added to it; if more as alkaline, it may be mixed with Vichy, and so on. In this manner, the original property of a water may be variously modified; and its mode of operation, and medicinal efficiency, more or less changed, by blending it with another; yet this must be done with a thorough knowledge of the analysis of the waters, and in accordance with the laws of chemical affinity; * and thus, effects may be produced on the

[&]quot;I owe to Mr. Schweitzer, the following particulars, which should be considered a general rule for selecting such waters, as, respecting their chemical constitution, do not form insoluble precipitates, when mixed with cach other. Mineral springs, in which earthy sulphates, muriates, or nitrates predominate, and which contain only

disease, and changes brought about in the constitution, which would have been unattainable, had such a modification not been resorted to. Nevertheless, it is neither advisable, or necessary, to mix more than two different waters together; and it is imprudent to be frequently exchanging one for another, as I have sometimes seen patients do, upon their own authority.

The idea, commonly entertained by patients, who feel low or relaxed, after a course of one or other of the resolvent mineral waters, that some Chalybeate must be taken, for the sake of strengthening them, is quite erroneous; for even Karlsbad, a very powerful resolvent, and Marienbad, which often produces, copious and frequent evacuations, never actually weaken the constitution. The action of the water, and the necessary low diet, may certainly, sometimes, occasion a temporary feeling of relaxation; yet this will pass away,

a small proportion of free carbonie acid gas, ought not to be mixed with those abounding in carbonates of soda; as a precipitates of earthy carbonates, would be the result of such a combination: if, however, the earthy ingredients are in small proportion, with an excess of free carbonic acid gas, the precipitate will be again dissolved, forming earthy bicarbonates. Likewise mineral waters, containing, to any amount, the carbonates of Baryta and Strontia; or their respective chlorides; or chloride of calcium; ought not to be mixed with those containing sulphates, as insolubble precipitates are thereby formed.

of itself, as the operation of the water subsides; and if the constitution is then free from essential obstructions and morbid encumbrances, the vital power itself will regulate the functions of the economy, and restore its strength and vigour. There are, however, cases, in which a Chalybeate may be used, with advantage, after resolvent waters; but this should not be done, until they have been discontinued several weeks; for, if taken immediately, the Chalybeate often interferes with the subsequent operation of the resolvent; or it may give it a wrong bent; or may actually counteract it.

It is quite impossible to state, beforehand, the exact time, for which the use of mineral waters must be continued, to effect a cure. The duration of a course, depends entirely on, and can only be determined by, the effects the waters produce on the constitution, and on the disease itself. An untimely interruption, or a too-early termination of the course, have often prevented the successful completion of a cure; and harm has been done, when the more powerful resolvent waters have been continued too long; which, however, does not so commonly happen with the Chalybeates.

While the method of employing mineral waters is of paramount importance, in securing the success of the treatment; the time of the year, in

which they ought to be used, is, perhaps, not less so, and should never, therefore, be overlooked.

It is a generally received idea, that summer is the most appropriate time for their use; and this certainly holds good, with regard to the external and internal employment, of the natural mineral waters; principally because summer is the pleasantest season for travelling to the springs; the climate of the watering places in Germany, almost all of which are situated in mountainous districts, is then most uniform: and baths are best taken at this period of the year. It is quite different, how ever, with respect to the internal use of the mineral waters, prepared at Struve's establishments; provided these are situated in places, the climates of which are steadier and milder, at all seasons of the year, than those of the spas of Germany; and when care is taken to guard against any occasional inclemency of weather, by proper clothing, &c. On account of its far-famed salubrity, and temperate climate, perhaps, no place could have been more judiciously selected for such an establishment, than Brighton.* It is certainly not

^{*} The pump room of the German Spa, at Brighton, is open from the beginning of May to the end of November; but all the cold waters may be sent to any part of the kingdom, at any time of the year, in bottles; and the thermal waters can likewise be procured in Brighton, if due notice is given to the director of the Spa.

to be denied, that the summer months are, in many instances, best suited to a course of the waters; but this ought not to be received as an immutable rule, for all cases. We should rather, I think, make the constitution of the patient, and the character and stage of the disease, the leading points of criterion; and prescribe those remedies at that particular season of the year, which coincides best with the above indications.

In the warm season, mineral waters are used internally, with the greatest advantage, in all those maladies, in the treatment of which, it is an object to produce in the economy, an action towards the surface; to promote the cutaneous functions; when the perspiration is to assume a critical character; in diseases connected with irritation of the brain, the lungs, and the kidneys; in habitual diarrhœa, &c. But in obstructions of the abdominal viscera, especially the liver, where frequent and active exercise, contributes materially to expedite the cure, the dog days are little qualified for taking the waters. This season is likewise not to be chosen by corpulent patients, or those of a very lax fibre, and who are habitually inclined to perspiration.

The general principle, followed in the treatment of acute diseases, that, during the period when the fever, and other symptoms remit, the system is most disposed to take up medicines, and to allow them to act; is likewise applicable to chronic maladies. Most of these diseases are influenced by the various seasons of the year; some displaying themselves in periodical paroxysms. and others undergoing regular exacerbation and remission. It should never be omitted, strictly to investigate this particular character, which, in these maladies, is often rather obscure; and when it is discovered, the waters ought always to be prescribed in the stage of remission. Certain cases of gout, chronic rheumatism, hemorrhoidal fluxes, &c. have a regular appearance and intermission; liver affections, hypochondriasis, &c. are generally aggravated in hot weather; and many nervous 'derangements become less severe; and some disappear altogether, in winter. It must further be recollected, that the assimilative process, as well as the nervous re-action of the organization, are considerably lowered in most individuals, by the high summer temperature. The fact must also be kept in mind, which has been so well described by Sir Henry Halford, in one of his orations at the College: that, under whatever disease, or diathesis only, an individual may labour, it will become either aggravated, or ameliorated, at particular periods of life; a circumstance resulting from spontaneous changes, which take place in the constitution at these times. These periods usually occur, more especially in scrofulous persons, every seventh year-that is, at the ages of seven, fourteen, twenty-one, and so on. Other circumstances must likewise be considered: for instance, the time when the patient is least occupied by business -when his mind is likely to be in the most tranquil state; whether, more especially in inveterate disorders, a preparatory treatment by mild means,-such as a course of whey; of mellago, or extract of taraxacum, chelidomium, &c. may not be previously necessary; and whether a single lengthened course of the waters will be requisite; or whether we should prefer two shorter ones in one year; or three in two years. In this respect, it must be remembered, that the result is materially different, whether the same quantity of water is used in three, or in eight weeks; or in two or three courses, in one or two years.

The internal use of mineral waters, is, in most cases, much assisted by bathing. If the expense of baths prepared with the factitious waters, were not so great, they might be used for this purpose; and would be attended with all the advantages derived from baths of the natural springs. This want—the only one attached to Struve's establishments—is, however, less felt at Brighton, where

(with the exception of the true Russian vapour bath)* there is ample opportunity afforded by several well-arranged establishments, for taking baths of every description, and also for bathing in the open sea.

During the internal use of thermal mineral waters, and those cold oncs, which promote the cutaneous function in the slightest degree; cold baths of every kind, are absolutely inadmissible. They may, however, be used during a course of Chalybeates, or of those cold springs in which the tonic property is rather predominant; provided the case does not otherwise present any contra-indications; still, on the whole, I should say, that, while the waters are taken internally, warm bathing is preferable; and the cold bath ought only to be permitted as an exception.

As cold and hot, are merely relative terms, corresponding to the sensations, produced in the individual; nothing certain can be said, concerning the exact degree of temperature for a bath; the following may, however, be taken as general rules.

^{*}That a bath of this description, has not hitherto been established in Brighton, to make the opportunity for bathing complete, is indeed to be wondered at, as well as lamented. The Russian vapour bath, with the improvements that have been added to it, of late years on the continent, is one of the most benefical and effective remedies we know of, in a vast number of chronic diseases.

If, when drinking the waters, the patient is allowed cold bathing, either within doors, or in the open sea, it is requisite that he should prepare himself for it, by taking several tepid baths; commencing with ninety-four degrees of Fahrenheit, and gradually reducing them to nearly the temperature of the sea; which, in autumn, when it is highest, is about sixty or sixty-five degrees, at noon. He should never go into a cold bath, unless the temperature of the body be somewhat elevated, either by exercise or otherwise. He should plunge in, never remaining beyond a minute or two in the water; then dry the body rapidly; dress without delay; and walk about. If these rules are properly observed, an agreeable glowing sensation, over the whole frame, together with increase of muscular vigour, and of the spirits, will most likely follow; but should these results not take place, the cold bath is not to be repeated. When used in this manner, cold bathing acts as a powerful stimulant to the vital energy, by rousing it to salutary exertion, and the organization thus becomes fortified. Similar advantage is derived from the cold shower bath.

The tepid bath, (under ninety-four deg. Fahr.) detracts somewhat from the animal heat, slightly depresses the vascular and nervous energy, and

therefore, calms irritability and sensibility, if abnormally elevated; it somewhat augments the secretions of the kidneys and of the intestines; the body feels cool, and the spirits are serene, and enlivened under its use.

The warm bath (from ninety-four to ninety-eight deg. Fahr.) slightly rouses the vascular action; increases the function of the skin, and of the lungs; tranquillizes the nervous system; mitigates pain; and imparts a feeling of comfort both to body and mind.

The hot bath, (from ninety-eight deg. Fahr. upwards) elevates the animal heat; increases the vascular action; augments all the secretions, particularly of the skin; and body and mind are thrown by it into a state of excitement, which is followed by relaxation.

I cannot enter here into the particular indications, under which the different baths are to be used in disease in general; and, perhaps, it is not necessary for me to do so, since, I think, they may be easily inferred, from what has just been stated, about their actions, and the effects produced by them.

The temperature of the water must be kept uniform, during immersion. The bather may remain in it, as long as he feels quite comfortable;

but as soon as a sensation of chilliness, or excitation ensues, he ought to leave the bath immediately. The time for remaining in the water, is, generally, from fifteen to thirty minutes; which may be prolonged, according to circumstances, to an hour, and even to two, three, or four hours; but then an attendant should remain in the bathroom. The bather is not to keep motionless, or fall asleep, while in the water; but must move about, having the whole surface of his body, especially the abdomen, rubbed with flannel, or a brush; or his limbs shampooed, which is of great service. Upon relaxed constitutions, and weak and torpid nervous systems, a cold shower bath, taken for a few seconds, after leaving the warm bath, has a very strengthening and salutary effect. It may be either decided by the physician, or left to the patient's own feeling, whether he is to lie down and rest, or to take gentle exercise after the bath: walking is most desirable, provided the patient's health, and the weather will permit. For those who drink the mineral waters, the most appropriate time to bathe, is two hours after a light breakfast, or in the evening, one or two hours after tea.

Lavements of mineral water, deserve to be more frequently adopted than they have hitherto been.

By this mode of application, the water being brought into contact with a larger extent of surface, a greater quantity can be introduced into the circulation, with less inconvenience to the stomach. In this manner, the operation of the water drank, is not only assisted, but its action more directly concentrated on the abdominal viscera.

In ophthalmic diseases. I have likewise ordered Pyrmont water to be used, in the form of a continued slender stream, directed against the eye, by means of a fountain.* This has frequently been attended with very great benefit, especially in weakness of sight, incipient amaurosis, &c. provided vascular or nervous excitement be absent, or after it has been subdued.

Did the limits of this little work admit of it, I might enlarge much more fully, upon the proper method of using mineral waters; what I have already said, may, however, suffice, and for further general information, I beg to refer the reader to the next chapter.

SOME ADVICE FOR LADIES.

Mineral waters being remedies not unpleasant to

^{*} The ophthalmic fountain, which I am in the habit of recommending for this purpose, may be had of Messrs. Brew & Co., 71, East Street, Brighton.

the palate, and gentle and mild, yet powerful in their action, would appear to have been prepared by Nature, particularly for the fair and tender sex. For many centuries, they have been employed in the treatment of the diseases peculiar to females; and when judiciously applied, have frequently produced the most satisfactory results, in removing tedious and obstinate maladies of the organs, marking the female constitution; which, besides causing many harrassing complaints, are not unfrequently the cause of preventing the patient from the happiness of having a family.

The number of such complaints, being very considerable, and their causes, nature, complications, symptoms, &c. extremely diversified; it is impossible to lay down any decided plan of treatment, without a careful and strict examination of the individual case. In what constitutional or local, functional or organic, affections, peculiar to ladies, mineral waters are applicable, has, I think, been sufficiently explained in the foregoing pages; by which the patient will likewise be determined, on the choice of the spring best adapted for her complaint.

Every mineral spring possesses its own specific value, both in respect of the nature of the disease to be treated, and the individual constitution of the patient; and no one water, therefore, deserves that universal preference, which of late years, has been accorded to one or two particular kinds; or, I should rather say, certain watering places, have become more in repute with ladies, solely from the circumstance of one patient advising another, to follow the same plan of treatment she had herself derived benefit from,—than which, nothing can, in general, be more fallacious.

According to circumstances, a mineral water, either of a resolvent, alterative, or tonic property, has proved highly beneficial in irregularities of the periodical indisposition, in respect of time; alterations in its character or nature; when that indisposition is insufficient, or excessive, and attended with pain or wholly suspended; and also in some cases, where a vicarious discharge occurs, from other parts or organs of the body. If chronic leucorrhea, or chlorosis, is occasioned, by local or general true debility, or impoverished blood; and local irritation, obstruction, or organic disease is absent, the use of one of the Chalybeates is most beneficial. But, on the other hand, if these maladies depend on dyspepsia; or on anomalies in the process of sanguification; or in the abdominal circulation; on a particular crasis of the blood; on functional or structural derangement of the uterine system; one of the resolvent waters must be used. if the uterine system is in a state of sub-inflammation, the local treatment cannot be dispensed with, during the course of the waters. The resolvents are likewise of great service, in local plethora, and in languid and imperfect circulation, in the veins of the abdomen, more especially those of the uterine system; in congestions, obstructions, slight indurations, and polypous growths of the womb; in most forms of hysteria; in a tendency to abortion, and in sterility. When the two last complaints proceed from true debility, the tonic waters are indicated. The chalybeates are likewise used with great advantage, in cases, where a considerable degree of weakness, occasioned by excessive loss of blood, during parturition, remains for a long time after delivery; also in some sequelæ of the puerperal state; in swelling of the legs; in affections of the veins, after the acute state of a disease has past away, &c.

The employment of mineral waters is inadmissible during pregnancy, with the exception of Seltzer, which frequently tranquillizes the sufferings of this condition; but some of them, especially the Chalybeates, are used with great advantage both to mother and child, during the period of nursing. The supply of milk will not be diminished

by taking them, unless the bowels of the mother are too much acted upon; they, nevertheless, must be regularly moved, to prevent purging to the infant. When the child is weaned, a Chalybeate may sometimes be of great service to the mother.

Ladies, who propose taking mineral waters, will do well to commence them directly after the periodical indisposition is over. This frequently makes an earlier appearance during the use of the waters; sometimes more copiously than before, sometimes less so; or it is altered in quality, or attended with a considerable degree pain. The patient need not be alarmed by these changes; for, being caused by the water, the effect will cease with its action, and all will come right again at the conclusion of the course. In cases of insufficient or suspended menstruation, the pain caused by the waters in the womb, may always be considered as a favorable sign of recovery. When the periodical indisposition is not disturbed in any way, the water may be continued without interruption; but if the period becomes influenced, and changed in time, kind, or quantity; or is more painful than usual; it is advisable to reduce the quantity of water to one-half or a fourth, and to take it warm; or even to discontinue it altogether, for the time. As soon as the flow has ceased, the quantity originally taken is again to be resumed. When the period has been suspended for a long time; or has been of very insufficient quantity; the same quantum of water ought to be continued, however great the pain, produced by drinking the waters, may be; this being a sign, that nature is endeavouring to regulate this particularity of the female constitution. When nature changes, the use of mineral waters, if resorted to in proper time, is of great advantage, in obviating the complaints, which generally attend that climacteric period of life, or at least in mitigating their severity.

The employment of these waters, is, on the contrary, of very doubtful utility, in excrescences and tumors of the womb; in accumulations of morbid matter within its cavity; and in organic diseases of the ovaries. In an advanced state of induration; in softening, ulceration, and all cancerous diseases of the uterine system, their use is decidedly injurious.

In the complaints of children and young people, provided the general regimen be judiciously regulated, no means are perhaps better qualified than mineral waters, to eradicate the scrofulous diathesis; to remedy the ordinary forms of simple scrofula; to alleviate and quiet tuberculous diseases in

their incipient stage; and to improve the constitution generally. Their use is likewise of great benefit, when the period of puberty is retarded; and when the constitutional peculiarities, characteristic of either sex, are slowly or imperfectly developed; which, in females, is often the source of many future serious maladies; and of the deprivation of maternal happiness. If indications are present, the merit of mineral waters, when brought into play, at any time, from childhood to adolescence, cannot therefore be sufficiently impressed upon the minds of those parents, who are anxious to ward off the visitation of that plague of mankindscrofula-from their offspring; and to endow them with physical, as well as intellectual health; by doing which, they will not only satisfy their own feelings, and spread happiness over their own immediate connection, but also confer benefit on society at large.



CHAPTER IV.

GENERAL INSTRUCTIONS FOR PATIENTS USING MINERAL WATERS INTERNALLY.

Having already transgressed the limits I had prescribed to myself, in commencing this volume, I shall only be able, in the subsequent pages, to lay down a few general rules, for the guidance of those, who purpose using mineral waters internally. For more particular injunctions, respecting the proper method of employing this class of remedies, I beg to refer the reader to the foregoing chapter.

The constitutions of many persons who undergo a course of mineral waters, are more or less certainly disordered; yet not to such an extent, as to produce decided, severe, or serious disease; and,

perhaps, their complaints may be temporary, only. A greater number, however, have already consulted sundry physicians,—perhaps, almost every practitioner within their reach; and have tried, in its turn, every drug that can be procured from the apothecary's shop; in the vain endeavour to rid themselves of the malady that possesses them. Now it must be admitted, that these are two classes of bad patients. The first, not being continually reminded by their bodily ailments, that they really are patients, seldom think of modifying or altering their accustomed mode of living, or of suspending their usual occupations; but continue to indulge in the pleasures of the table; and to commit imprudence of various kinds, just as if they were in perfect health. Whilst the others, again, were exhausting the curative means of the Pharmacopæia. their diseases have not only become more deeply rooted, but have frequently assumed a more or less complicated aspect, which renders them extremely unmanageable.

If a patient of the former class, wishes to participate in the great benefits, which mineral waters are certainly qualified to afford, he must have the earnest determination to become cured of his malady,—that is to say, he must entirely, or, at least, in a great measure, change his habitual mode of living;

and follow out, with scrupulous punctuality, and conscientious accuracy, the instructions laid down for him. He, on the other hand, who uses mineral waters, as ultimate means of recovery, must endeavour to reject all anxiety and despondency, concerning the obstinacy of his case; and trust, with hope and confidence, as well as firmness and perseverance, to the almost divine power, which these sulutary springs not unfrequently display. Well may patients here be reminded of an inscription placed over the entrance of the baths of Antony, at Rome:

"Curarum vacuus hunc adeas locum, Ut morborum vacuus abire queas; Non enim hic curatur qui curat!"

But, on the other hand, the patient must not indulge in unreasonable expectations. If his social and domestic circumstances are unfavourable; and his mental and bodily constitution, and the malady under which he suffers, are not fit for the employment of mineral waters; if the water is injudiciously chosen and improperly used; or the general regimen not paid due attention to; these remedies can, of course do no good; nay, they may, under such circumstances, often do considerable harm.

If it has been determined that a disease shall be treated by mineral waters, the patient ought not to content himself with the idea of making a mere trial of these powerful means; for if he has no other intention, he had better leave them untouched, altogether; if he meddles with them at all, he must make up his mind at once, to go through with a regular course. It is true that summer is, for several reasons, a very good season for taking the waters; yet they may be perfectly well used at any time of the year. This is best decided upon, more particularly with reference to the state of the patient's constitution; the character of his disease; and also according to the climate of the place, where the waters are intended to be used, as has been more fully explained in page 103.

I .- Rules to be observed previous to the course.

In order to afford the waters a fair chance of operating successfully, a short preparatory discipline, will, in most cases, be very useful, and in some absolutely necessary. In general, it will suffice to observe a regular and moderate diet; to avoid late hours, and excess of any kind, for about a week or two, before commencing; the bowels should likewise be freed from gross impurities; and if the

patient be in the habit of taking but little drink, the stomach ought to be gradually accustomed to the reception of a larger quantity of liquid. Patients of full habit of body should be bled; and any inflammatory action, either general or local, that may be present, must be subdued by proper means.

Before setting out for the Spa, the patient should arrange all affairs, whether public, professional, or domestic, that may be likely to require his attention, for some little time to come; so that be may have six or eight weeks, or even longer, during which, his mind will be free from the care and anxiety of life, and, if possible, in a state of complete tranquillity.

In complicated diseases, of long standing, which have been under medical treatment, for a length of time—and more especially if there is anything peculiar, in the nature of the case—the patient should procure from the physician, last in attendance upon him, a written statement, fully detailing the causes and course of his malady; the plan of treatment bitberto pursued; and all peculiarities concerning his constitution and temperament, as well as in his mode of living and occupation; and also as to the locality and climate of his residence. A professional document of this kind, would enable the physician at the Spa, to get at once, a clearer

insight into the state of the patient's constitution, and the nature and character of the disease; which, without it, is, in chronic maladies, almost impossible for any medical man to acquire, in one or two interviews, with a person whom he never saw before.

The patient should take with him to the Spa, a sufficient quantity of linen, in case frequent bathing may be necessary; also, both warm and light clothing, to suit changes of weather and temperature; lastly, a syringe for injections. If he lives at a great distance from the Spa, he should travel slowly; avoid all mental and bodily excitement; and take repose and sleep, whenever he feels fatigued or exhausted. These precautions are requisite, that he may not be prevented from commencing the use of the waters, soon after he has reached the Spa.

When the invalid has arrived, his first business should be, to lay the written account of his case, before a physician of the place; to consult him on the selection and proper use of the water; and also, as to where it would be best for him to take up his temporary residence; for this, at least, at Brighton, is a question of some importance, with many patients.

It is true, that the Brighton climate is one of

the most healthy in England; yet, it varies considerably in different parts of the town. In the East end, which is situated much higher than the West, the air is dry, cool, and bracing; and, therefore, will be found better adapted for individuals of a relaxed fibre. In the West end, again, the air is somewhat moist, mild, and more temperate; consequently it is more suited for those, who suffer from affections of the respiratory passages and lungs.

Those, who come from London, or the interior of the country, are generally subject to a slight bilious attack, on arriving at Brighton. In such cases, the commencement of the course, had better be deferred for a few days; when the derangement of the abdominal organs, will either disappear of itself, or by the assistance of an aperient,—for instance, a dose or two of the waters of Seidchütz or Püllna, taken warm.

II.—Rules to be observed during the course.

In order to drink the waters in a state of genuine power, the patient must go to the Spa itself, where they issue, either from the bowels of the earth, or from the spout, in the pump-room of one of Struve's establishments. Should health, however, not permit the invalid to leave his room, the water may be sent to his residence; but its virtue will then be, in some measure, modified and diminished. If he is unable to undertake the journey to the Spa, at all, and is therefore obliged to use the waters at home; although not altogether impossible, it will yet, in that case, be very difficult for him to obtain the thermal waters; the cold ones, however, he may easily procure. But I am decidedly of opinion, that an equal degree of benefit, can never be derived from the use of mineral waters, at home, as when they are drank at the establishment; because there does not then exist sufficient inducement, for the invalid, to make the necessary alterations, in diet, occupation, and mode of living in general. Besides, it cannot be denied, that, although the waters, themselves, are undoubtedly the principal means in the treatment: yet the change of air, locality, and society; the journey; and at Brighton, the peculiar benefit of a sea-side residence, must, in many cases, be considered additional causes of recovery.

The early part of the day is certainly the most appropriate time for taking the water. The stomach is then empty, and the whole digestive apparatus best prepared for the speedy absorption and easy assimilation of the water; mind and body too,

are, after nightly repose, most susceptible of the salutary influence of the morning air; at which time, moreover, the atmosphere is less oppressingly warm, than at an after period of a summer day. The patient should, therefore, endeavour to make his appearance, as early as possible, at the pump room; and ought to make it a rule never to be later than half-past seven or eight o'clock. The habit of indulging in sleep, in the morning, has so powerful an influence on individuals, especially ladies of delicate constitution, and very sensitive nerves, that if they deviate from it for a single morning, head-ache, loss of appetite, nervousness, lassitude, &c. will be the consequence, for the whole day. Persons so situated, ought, therefore, to accustom themselves to early rising, by degrees; or, if this cannot be done, they may go to the Spa, at a somewhat later hour than is usual. If a perspiration, appearing to have the nature of a crisis, should be present during the night, it would be highly imprudent to check it; on the contrary, it should rather be promoted by some warm drink,thermal water, for instance. Under such circumstances, the patient should not get up, until the perspiration has perfectly subsided; and then, having clothed himself with due reference to the susceptibility of his skin, and the state of the weather, go to the Spa, at as early an hour as conveniently possible. It is, likewise, not advisable for those suffering from affections of the air passages or lungs, to go to the Spa at a very early hour; especially if the morning is cold or damp, and the wind from the East or North.

To the more particular observations, which have been made, at page 99, respecting the use of the waters, in a medical point of view; I shall now add a few rules, concerning the patient himself, while he is drinking them.

After being properly prepared, as I have before spoken of, and the water most appropriate for his case, being duly fixed upon; the invalid begins by drinking, on the first day, one or two beakers, of six ounces each; it may sometimes, however, be necessary to commence with half a beaker only. He then increases the number of beakers, each successive day, by one or two, or by half a one, till the highest number is reached, which, generally speaking, will be best determined by the drinker's own feeling; for there is, if I may say so, a certain point of saturation, beyond which it is but seldom advisable to go. He now continues to drink the suitable quantity of water, every day. regularly, without any interruption, except what may be caused by urgent circumstances, until

about the beginning of the last week of the course; when he may gradually diminish the number of beakers, in the same ratio, he observed in increasing them, at the commencement. In changing the waters, the following plan should be pursued. In going from Marienbad to Eger, for instance, if the quantum is six beakers, begin on the first day, with five of Marienbad, and then one of Eger; on the second day, first take four of the former, then two of the latter; proceeding in this manner, till the change is complete.

It frequently happens, that the cold waters disagree with weak and irritable stomachs; in such instances, it will be proper, at first, to temper them, by mixing, as the case requires, some hot milk, or a little Ems or Karlsbad, with them, until the stomach accustoms itself to the natural temperature of the water. The hot waters, especially the Sprudel, can only be taken by sipping; all others ought to be taken slowly, and in small draughts; but those which are richly impregnated with carbonic acid gas, may be drank in large draughts, so as to let as little as possible of the gas escape, provided it agrees with the patient. If it disagrees, which is often the case, at the commencement of the course, the patient will do well to cause some of the gas to evaporate, by stirring the water with a spoon; and also to allow a longer time to elapse between the successive beakers; but whenever the stomach is able to bear it, the water ought to be taken with its natural quantity of gas.

There should be an interval of about fifteen minutes, between every two beakers; or, I should rather say, the subsequent beaker is not to bc drank, as long as the stomach feels in the least degree full, or burthened, by the quantity of water previously taken. During this time, the patient ought, health and weather permitting, to take gentle exercise in the open air, and, if possible, in company with a pleasant and agreeable companion. The exercise should not be too active, nor prolonged to an extent that will produce fatigue, but must be proportioned to the patient's strength, and varied with occasional rest. Continual, or too fast walking; mental excitement and depression, caused by earnest conversation; profound reading; gloomy thoughts about the malady from which he suffers, are prejudicial at all times, but particularly when drinking the waters; and will probably make the delicate invalid, feel uncomfortable and languid for the whole day. Those who are unable to lcave their residence, should walk backwards and forwards within doors; and if they cannot walk, or are confined to bed, the waters may be taken in a horizontal, but not a sitting posture.

To promote the absorption and digestion of the quantity of water, drank during the morning, gentle exercise should be continued for an hour after the last beaker; but if exercise should become an exertion, it is far more advisable, especially for weak persons, and delicate ladies, to return home in a carriage, and lie down on a couch until the digestion of the water is completed. Many ladies do themselves more harm than good, by too much walking about in the morning; and in this manner, frequently bring on swelling of the ancles and feet, and many other temporary ailments.

To prevent toothache; the settling of tartar on the teeth; and laxity of the gums—which, in some cases, may be caused by the mineral waters, especially the hot ones—the following injunctions are worth observing. First, in drinking, avoid as much as possible, bringing the water in contact with the teeth. Secondly, on coming home from the Spa, clean the teeth immediately, with some astringent tooth powder; and if the gums are naturally lax, the mouth may be washed once or twice a day with an infusion of sage, mixed with some spirits of wine; or a solution of alum; or some tincture of myrrh, or catechu.

A strict adherence to a properly regulated plan of diet, is indispensable, during the employment of mineral waters, less, in reference of the water, itself, than to the disease, for which it is taken; for it is an indisputable fact, that without this observance, the treatment of chronic maladies, cannot be successful. I do not mean to say, that the patient is to subject himself to painful privations; but he must religiously eschew any article of food or drink, that cannot be granted to him, on account of the state of his constitution; or because it might favour the disease, and prevent recovery.

In the first place, it may be remarked, that the absolute quantity of food required to sustain the frame, is very moderate; and that almost every one, even the most temperate, in this respect, takes much more than is essentially requisite, for the maintenance of the body in a due state of strength. Great temperance in quantity of food, ought, therefore, to be the primary object of the patient's thoughts. It is an excellent rule to stop eating, just at the moment when he begins to enjoy it most; for every mouthful taken beyond this point, is superfluous, and moreover will soon denote itself to be obnoxious. In such a case, the patient had better confine himself to a single dish;

for, as Dr. Paris says, "a variety of dishes create an artificial appetite." If he eats slowly, masticates well, and attends carefully to the first feeling of satiety; he may take such a quantity, as he knows from experience,-and this is what Dr. Johnson calls "the golden rule"-"will produce no langour after eating; no unpleasant sensation of mind or body, during digestion." The number of meals must of course vary with each individual, according to the power of digestion; the degree of exercise; and the age and quality of the food. Those who have weak digestive power, should eat often during the day, but very little at a time, and also at regular intervals. For all others, two meals, viz. breakfast and dinner, with tea at night, ought to be sufficient; lunch and supper must be totally omitted during a course of mineral waters.

The breakfast must not be taken, until the quantity of water which has been drank during the morning, is entirely digested, and the stomach feels no longer full or distended, but quite comfortable, and longing for some food. It may consist of weak tea, coffee, cocoa, barley water, thin gruel, arrowroot, sago, milk and water; stale bread, or well-made toast; one soft-boiled egg; a small bit of chicken, or a slice of lean mutton. Every other sort of meat, and

particularly fish, new bread, spongy rolls, hot buttered toast, muffins, &c. are injurious. Tea must be omitted, when the Chalybeates are taken, and coffee, by those who suffer from affections of the liver. In cases of weak digestion, it is advisable to divide this repast into two parts: the first to consist of a cup of one of the above-mentioned liquids, with dry toast or biscuit, and perhaps an egg; and after the lapse of two or three hours, some cold mutton, or chicken, or a mutton chop, may be taken. In this manner, all the advantage of a substantial breakfast is gained, and moreover the profit of a lunch added, without any of the evils attending both.

The tyrannical fashion of dining at six or seven, or even later, is absolutely incompatible with a course of mineral waters; and if it is continued, the patient can by no means expect that benefit, which, under a differently-regulated regimen, he would propably derive from their use. The very latest hour for dinner, that can be sanctioned during a course of mineral waters, is five o'clock. This meal ought to be frugal, simple, and every dish dressed in the plainest manner possible. It may consist of any sort of butcher's meat, except pork; of game, poultry, (with the exception of duck and goose) and the lean part of venison,

either roast or boiled, and not too much underdone. Light vegetables, without butter and with little seasoning, are admissible: as spinach, asparagus, French beans, mealy potatoes and carrots. Fine stale bread; plain puddings, made of bread, biscuit, ground rice, tapioca, and the like, but without currants or raisins; and ripe fruits, stewed or baked, may be taken. Plain water, or toast and water, with a spoonful of brandy; or Seltzer water plain, or mixed with a little wine and sugar, are uscful beverages. Malt liquors are very questionable; and I should say, had better be avoided. If wine cannot be done without, a glass or two of the kind which agrees best with the stomach, may be indulged in; a cup of coffee is, however, preferable after dinner.

All articles, not included in the above list, are improper. Fish might be permitted, if without butter and sauce it were not insipid, and apt to turn rancid; and with these additions, it cannot be allowed. Smoked and salt meats, stews, ragouts, and all other made dishes; heavy puddings, pastry, and highly-scasoned pies; every kind of raw fruit, greens, and salads; flatulent vegetables, such as cabbage, new or waxy potatoes, cauliflowers, &c.; every sort of provocative to the appetite, such as cheese, pickles. nuts, &c.; iced

cream, and acids of every description; the more fragrant aromatic condiments; oil, and even the smallest portion of melted butter, are injurious. Spirits, home-made wines, liqueurs, and all strong malt liquors, must be abstained from; and if the thermal waters are taken, cold beverages of all kinds, must, likewise, be avoided.

The evening meal or tea, should be the same as the breakfast, but without animal food. Those who have been accustomed to take spirits, before retiring to rest, may, if they cannot do without it, take a very small quantity of good brandy, in a tumbler of water. Supper, as stated before, can by no means be permitted.

Exercise in the open air, not only in the morning, at the time of drinking the waters, but also during the rest of the day, is in most cases, one of the conditions, requisite for a successful treatment by mineral waters; but it ought to be gentle, proportionate to the strength of the invalid, alternated with repose, and not prolonged to the extent of producing fatigue. If the state of health, or inclemency of the weather, &c., prevent out-door exercise, the plan recommended by Dr. Johnson, may be adopted, of going up and down stairs repeatedly, during the day; or that of Mr. Abernethy, of walking actively to and fro, as sailors do on

ship board, with the windows of the room thrown open. Although it has been said that "riding is the best exercise for regaining health, and walking for retaining it;" yet I perfectly agree with Dr. Paris, in thinking that one should not supersede the other; and where the two modes can be conveniently combined, the greatest advantage will be derived. Dancing can, certainly, not be objected to, during the use of the waters; but it must be indulged in, moderately, and not at late hours. Hunting, rowing, cricket, and other violent amusements, cannot be sanctioned, on account of the exertion caused by them, and the liability to catch cold, when too much heated. The best time for bodily exercise, is between breakfast and dinner; and when it is practicable, after tea likewise. One hour after breakfast, and two hours, or more, after dinner, should be permitted to elapse, before exercise is taken; it is imprudent and injurious to do so, either directly before, or immediately after a meal.

Rest is not less necessary than exercise. If there is the slightest feeling of nervous or vascular excitement; of weariness, lassitude, or fatigue; the patient ought to lie down on a couch, taking care to loosen or remove all ligatures. The horizontal position, or at least, sitting with the feet horizontally supported, is much to be recommended, during the course of mineral waters, to all persons of weak constitution, and lax fibre, particularly delicate females; to prevent swelling of the ancles and feet, and other inconveniences. The patient should avoid late hours, mental excitement, and bodily exertion, towards evening; and retire to rest, with a composed and tranquil mind, regularly at ten o'clock; in order that he may sleep well during the night, and be able to rise early, and go through, with sufficient strength, the next day's curative occupation.

There can be no doubt that a habit of rising early, and not sleeping during the day, is a very proper one, while mineral waters are used; but if all patients were indiscriminately advised to follow this practise, I am convinced, that more harm than good, would, in many instances, be the result. With respect to early rising, I refer the reader to page 126, and as to sleeping during the day, I have no hesitation in saying, that all persons of weak constitutions, -- more especially nervous, irritable, and delicate ladies,-who can sleep but little in the night, or who are in the habit of sleeping during the day; will do themselves less harm, in giving way to the natural inclination to slumber, than by repressing it forcibly. Patients of this description, may, therefore, at any time of the day, refresh themselves with half-anhour's sleep in the recumbent posture, removing all ligatures from the body; but during the digestion of any meal, especially dinner, they will do better to take a short nap, while sitting in an arm chair, with their fect horizontally supported.

It has already been obscrved, that anxiety, carc, grief, in short, mental disturbance of any kind, will impede the successful progress of a cure, by mineral waters; and to this, I cannot but add, that all scrious intellectual occupation, involving profound study, has a no-less pernicious effect. The patient must, therefore, endeavour to possess a tranquil and cheerful mind, together with hope and confidence in the remedy he is using. He should entertain himself with light reading, listening to music, and should seek agreeable society, where he may engage in cheerful and amusing conversation; that sort of company, however, is to be avoided, in which the mental or physical passions are likely to be excited.

It has frequently been stated, in the foregoing pages, that, during the use of mineral waters, the whole skin is more active and sensible to atmospheric changes; and that by promoting the cutaneous functions, the internal viscera become relieved, and excitement of the brain diminished.

It is, therefore, necessary for the patient to wear flannel, or at least cotton, next his skin; and to be careful in clothing himself, not only according to the season of the year, but also to the time of day; the kind of exercise to be taken; and with reference, likewise, to the state of the cutaneous functions. If proper attention is paid to the clothing, there need be no objection to out-door exercise, which is so essential to the treatment; but great care must always be taken, to guard against getting heated, or profusely perspiring; on account of the subsequent liability to catch cold. Sitting in a draught, riding against a strong wind, boating, and being out of doors late at night, must likewise be carefully avoided.

On commencing the course, all pharmaceutical means, which may have been in use, (either commonly, or as preparatory only,) must at once be discontinued; and during the course, no medicine whatever—whether domestic or otherwise—should be taken internally. Although this is certainly the general rule, there are yet exceptions to it: for instance, when the stomach is actually too weak to digest the waters, or when the appetite is very deficient; it will then be advantageous to take some bitter stomachic,—as a spoonful of the compound tincture of Gentian, diluted with a

little water, two or three times a day; the tonic property of which may be increased, according to Dr. Johnson's plan, by adding half-a-grain of sulphate of quinine. The bowels, also, often require some assistance. If they are not sufficiently acted upon by the water drank, some Karlsbad salt may be added to it; a dose of Seidschütz or Püllna occasionally taken warm; a table spoonful of the mellago of taraxacum, taken in some water, twice or thrice a day; or injections of common, or sea-water,-and, in particular cases, of one or other of the mineral waters,-may be used, warm or cold, once or twice a day, if required; or alternately with the above-mentioned means. In cases where there exists a high degree of muscular or nervous irritability; spasm, fever, or inflammation; a congested state of any organ; hemorrhage, profuse diarrhea, and vomiting; or when the symptoms or pains of the original disease, are increased, or altered in kind-which is not unfrequently the case in obstructions, enlargements, &c. of the abdominal viscera—an active and rigid treatment will often be necessary; but this must be conducted by a physician.

No patient, who drinks mineral waters, should take cold, hot, or shower baths, without proper advice; he need not, however, be afraid of tepid or warm baths, the use of which, will assuredly favour the internal action of the water. While the resolvent waters are drank, I should recommend patients in general, to take a tepid or warm bath, twice a week, some two hours after breakfast, for about twenty or thirty minutes; on leaving the bath, health and weather permitting, to take exercise; after which, rest for half-an-hour or one hour; and then, go to dinner. Weak persons, and delicate ladies, should, however, repose on a couch, immediately after the bath, and also before dinner; using gentle exercise, during the intervals. An inclination to sleep, must be resisted, directly after bathing. For further instructions with regard to baths, see page 108.

III.—Some injunctions respecting the termination of the course; and the conduct of the patient, after it has been discontinued.

It has been already mentioned, that the action of mineral waters, is not limited to the time of drinking them, merely; but that it continues for several weeks, and in some cases, even months, subsequent to their use having been suspended. In the truth of this, all physicians, who have paid any attention to the operation of this class of remedies, concur;

but whether recovery will take place during the course, or after it; and under what phenomena the disease will abate; it is, in the majority of cases, almost impossible to predict.

When the disease is of no great severity, or of short duration; and the water has been judiciously selected, and properly used; the patient will almost always be restored to health, during, or at the close of the course; without any, or at least, with but little inconvenience. In severe maladies, on the other hand, which are deeply rooted, and of long standing; an amelioration may not only not take place, during the use of the waters, but the old evil may become decidedly aggravated, and even new complaints make their appearance. It is under such circumstances, that-in consequence of the revolution, brought about in the system, either towards the middle, or some time after the termination of the course, -more or less violent symptoms are produced by the action of the waters: which, however, as experience has proved, are to be considered in the light of a salutary crisis. These symptoms are, in general, a feeling of uneasiness, lassitude, and drowsiness; the sleep is now deep and heavy, now restless and unrefreshing; the appetite is capricious, on some days excellent, on others, moderate, or almost entirely absent : the

alvine and urinary excretions, are at one time healthy, at another, irregular, and of a morbid appearance; sometimes violent vomiting, diarrhœa, hemorrhoidal fluxes, or a fit of gout or jaundice, &c. will set in; accompanied by a number of painful sensations. In short, the state of the whole economy indicates, that the sanative power of Nature, roused into action by the remedy, is at open war with the original disease; a little more patience, and victory will follow; and in most instances, perfect health will be the reward for the sufferings previously endured. Sometimes, however, when the disease is of very old standing, it is, even then, not entirely conquered, but only to a greater or less extent mitigated; and if so, this may be taken as a sign, that a second, or at any rate a third course, will most probably be followed by a complete recovery; provided the disease, constitution, and age of the patient, afford reasonable grounds for such an expectation,

This is the usual mode, in which chronic diseases, when treated by mineral waters, abate, either during or after the course; and by which, recovery proceeds, and is completed. It is, therefore, evident, from it, how very imprudently those patients act, who,—if no immediate improvement, or, perhaps, an aggravation of their malady takes

place, at the beginning or during the middle of the course—become frightened, and abruptly discontinue the use of the waters, under the common, but certainly, in most cases, fallacious impression, that they do not agree with their constitutions.

From the nature of mineral waters, and their action on the animal economy, I am fully convinced, that when these remedies do "disagree," (as patients call it) the water drank, has been injudiciously selected; that it has been used in an improper manner; or that the disease and constitution, were originally unfit to be treated by means of mineral waters at all; for there can be little doubt,—provided the respective indications, as to the case itself, the choice of the water, the method of employing it, and the dietetic regimen, are fulfilled—that the waters will always agree with the patient, and will restore him to health, either during or after the first course, or at least, when a second or third one has been undergone.

In making the above remarks, I am particularly anxious, to impress fully upon the minds of patients, the fact, that often and often, the salutary operation of these means, has been destroyed, by an untimely discontinuation of them; and the object in view,—renewal of health,—in very many cases, entirely lost, simply by not repeating the

course. Such results, lamentable as they are to the patient, and tending to detract from the reputation of the mineral waters, generally happen, when patients either act upon their own judgment, or follow the counsel of others, who have themselves harely attempted a trial of, or who are prejudiced against these remedies. Proper advice, as to the discontinuance of a course, is therefore, a matter of just as much importance to a successful cure, as it was at the commencement.

As the action of mineral waters lasts for some time after the course is concluded, the patient, for from four, to six or eight weeks, must pursue exactly the same plan of diet and regimen, which had been laid down for him, while actually drinking the waters; he will also do well to make pleasant country excursions for a week or two. The observance of rule, is more necessary in cases where critical manifestations are to he expected after the course; or when it is deemed requisite to repeat it. Whether a second or even third course will be necessary; and whether the same, or another water: and what time will he the most appropriate for the next course, must depend entirely on circumstances, and can only be decided upon, about six or eight weeks, after the termination of the first one. It is during this time, that the critical manifestations, above mentioned, generally occur; and the state in which the constitution of the patient is then left, will be the best guide for the physician, as to the further conduct to be pursued.

There is no ground for alarm to the patient, regarding the critical effects, which follow the different courses, especially those of Karlsbad, Marienbad, Vichy, and Ems; if he does not interfere, leaves Nature to herself, and observes a proproper dietetic regimen, they will, however violent, subside, and leave him in a comparatively much improved, if not in a perfect state of health.

Supposing the disease to have abated, either during, or after the course, the patient ought, nevertheless, to consider himself for sometime afterwards, as merely in a state of convalescence. Consequently, he must beware of at once falling back into his old habits of life; and be guarded in exposing himself to the same mental or bodily exertion, as heretofore, or in returning to former indulgences; much less should he again revert to, perhaps, his favourite custom of drugging himself, with domestic medicines. He ought now, on the contrary, only gradually to resume his business, and resolutely to adhere to an improved mode of living, which, if he wishes to retain health,

should be well considered, and in unison with the general rules of diet and regimen.

After all that has been said in the foregoing pages, about the nature of mineral waters, and their action upon the animal economy; I think we may fairly come to the conclusion, that in chronic maladies, no other remedies possess greater power to reduce the vital manifestations to their normal condition, than these; provided proper advice is taken, and strictly followed by the patient; yet,—as a universal medicine, like the philosopher's stone, remains still undiscovered,—I may add, that no other expectations, as to their final effects, must be indulged in, than such as reason and experience will fairly justify.

I annex the analyses, according to which, the different mineral waters, are prepared at the Royal German Spa, at Brighton. Having been enabled to present them to the reader, through the kindness of E. Schweitzer, Esq., Director and Principal Chemist of that establishment; their accuracy may be fully relied on.

First Class .-

Carbonate of Soda			First	Ciass.—
Ditto of Lithia	Ingredients in	CARLSBAD.	of MARIEN-	SEID-
Ditto of Lithia	Carbonate of Soda	7.2712	5.3499	
Ditto of Baryta 0.0055 0.0028 Ditto of Strontia 0.0055 0.0028 Ditto of Lime 1.7775 2.9509 5.1045 Ditto of Magnesia 1.0275 2.0390 0.8235 Ditto (Proto) of Manganese 0.0048 0.0288 0.0032 Ditto (Proto) of Iron 0.0208 0.1319 0.0095 Sub-Phosphate of Lime 0.0012 0.0117 0.0117 Ditto of Alumina 0.0019 0.0088 Sulphate of Potassa 3.6705 3.6705 Ditto of Soda 14.9019 28.5868 17.6220 Ditto of Lime 1.1287 1.1287 Ditto of Strontia 0.0347 0.0347 Ditto of Magnesia 5.9302 0.0347 Ditto of Magnesia 5.9820 10.1727 Ditto of Sodium 0.01727 0.0023 Ditto of Sodium 1.2225 Ditto of Sodium 0.0184 Ditto of Sodium 0.0023 Bromide of Sodium 0.0023 Silica 0.4329		0.0150	0.0858	
Ditto of Strontia 0.0055 0.0028 Ditto of Lime 1.7775 2.9509 5.1045 Ditto of Magnesia 1.0275 2.0390 0.8235 Ditto (Proto) of Manganese 0.0048 0.0288 0.0032 Ditto (Proto) of Iron 0.0208 0.1319 0.0095 Sub-Phosphate of Lime 0.0012 0.0117 Ditto of Alumina 0.0019 0.0088 Sulphate of Potassa 3.6705 Ditto of Soda 14.9019 28.5868 17.6220 Ditto of Lime 1.1287 Ditto of Sodium 0.0347 Ditto of Magnesia 0.0347 Ditto of Magnesia 5.9302 Chloride of Ammonium 0.0023 Ditto of Pottassium 0.01727 Ditto of Sodium 5.9820 10.1727 Ditto of Magnesium 1.2225 Ditto of Sodium 0.0184 Ditto of Sodium 0.0023 Bromide of Sodium 0.0023 Silica 0.4329 0.2908 0.0900 To	Ditto of Baryta		1	
Ditto of Lime 1.7775 2.9509 5.1045 Ditto of Magnesia 1.0275 2.0390 0.8235 Ditto (Proto) of Manganese 0.0048 0.0288 0.0032 Ditto (Proto) of Iron 0.0208 0.1319 0.0095 Sub-Phosphate of Lime 0.0012 0.0117 Ditto of Alumina 0.0019 0.0088 Sulphate of Potassa 2 3.6705 Ditto of Soda 14.9019 28.5868 17.6220 Ditto of Lime 0.0347 Ditto of Magnesia 2 62.3535 Nitrate of Magnesia 3.5930 0.00347 Ditto of Pottassium 0.0023 0.0023 Ditto of Sodium 5.9820 10.1727 Ditto of Sodium 1.2225 0.0023 Ditto of Barium 0.0184 0.0023 Ditto of Sodium 0.0023 0.0003 Fluoride of Calcium 0.0184 0.0023 Silica 0.04329 0.2908 0.0900 Total 31.4606 49.6417 98.0	Ditto of Strontia	0.0055	0.0028	
Ditto of Magnesia 1.0275 2.0390 0.8235 Ditto (Proto) of Manganese 0.0048 0.0288 0.0032 Ditto (Proto) of Iron 0.0208 0.1319 0.0093 Sub-Phosphate of Lime 0.0012 0.0117 Ditto of Alumina 0.0019 0.0088 Sulphate of Potassa 3.6705 Ditto of Soda 14.9019 28.5868 17.6220 Ditto of Lime 1.1287 Ditto of Strontia 0.0347 Ditto of Magnesia 5.9302 Chloride of Ammonium 5.9302 Chloride of Pottassium 0.01727 Ditto of Sodium 5.9820 10.1727 Ditto of Calcium 0.01727 Ditto of Magnesium 1.2225 Ditto of Sodium 0.0184 Ditto of Sodium 0.0023 Solica 0.4329 0.2908 0.0900 Total 31.4606 49.6417 98.0133 Carbonic Acid Gas in 100 cu 1.002 1.002	Ditto of Lime			5.1045
Ditto (Proto) of Manganese. 0.0048 0.0288 0.0032 Ditto (Proto) of Iron 0.0208 0.1319 0.0095 Sub-Phosphate of Lime 0.0012 0.0117 Ditto of Alumina 0.0019 0.0088 Sulphate of Potassa	Ditto of Magnesia			0.8235
Ditto (Proto) of Iron 0.0208 0.1319 0.0095				
Sub-Phosphate of Lime 0.0012 0.0117	Ditto (Proto) of Iron		0.1319	
Ditto of Alumina 0.0019 0.0088 Sulphate of Potassa 3.6705 Ditto of Soda 14.9019 28.5868 17.6220 Ditto of Lime 1.1287 Ditto of Strontia 0.0347 Ditto of Magnesia ~ 62.3535 Nitrate of Magnesia 5.9302 Chloride of Ammonium 5.9820 10.1727 Ditto of Pottassium 5.9820 10.1727 Ditto of Calcium 1.2225 Ditto of Magnesium 1.2225 Ditto of Strontium 8 Ditto of Strontium 1.2225 Ditto of Sodium 0.0184 Fluoride of Calcium 0.0184 Alumina 0.4329 0.2908 Silica 0.4329 0.2908 Total 31.4606 49.6417 98.0133 Carbonic Acid Gas in 100 cu 1.200				
Sulphate of Potassa				0.0088
Ditto of Soda 14.9019 28.5868 17.6220 Ditto of Lime. 1.1287 Ditto of Strontia 0.0347 Ditto of Magnesia ~ 62.3535 Nitrate of Magnesia 5.9302 Chloride of Ammonium Ditto of Pottassium Ditto of Sodium 5.9820 10.1727 Ditto of Calcium Ditto of Magnesium Ditto of Magnesium Ditto of Sodium Ditto of Strontium Bromide of Sodium Iodide of Sodium Silica 0.0023 Silica 0.4329 0.2908 0.0900 Total 31.4606 49.6417 98.0133 Carbonic Acid Gas in 100 cu			~	
Ditto of Lime	Ditto of Soda		28.5868	
Ditto of Strontia				
Ditto of Magnesia	Ditto of Strontia			
Nitrate of Magnesia	Ditto of Magnesia	h.,	1 60	
Chloride of Ammonium Ditto of Pottassium 5.9820 10.1727	Nitrate of Magnesia		<u></u>	
Ditto of Pottassium	Chloride of Ammonium			1
Ditto of Sodium				
Ditto of Lithium		5.9820	10.1727	i
Ditto of Calcium	Ditto of Lithium		1011/2/	
Ditto of Magnesium 1.2225			<u> </u>	
Ditto of Barium			1	1 1 2225
Ditto of Strontium Bromide of Sodium	Ditto of Barium		1	1112220
Bromide of Sodium	Ditto of Strontium			-
Iodide of Sodium	Bromide of Sodium			
Fluoride of Calcium	Iodide of Sodium			
Alumina 0.0023 Silica 0.4329 0.2908 0.0900 Total 31.4606 49.6417 98.0133 Carbonic Acid Gas in 100 cu- 10.0000 10.0000 10.0000	Fluoride of Calcium	0.0184	!	1
Silica 0.4329 0.2908 0.0900 Total 31.4606 49.6417 98.0133 Carbonic Acid Gas in 100 cu- 10.0000 10.0000 10.0000	Alumina	0.0101	1 0.0023	-
Total 31.4606 49.6417 98.0133 Carbonic Acid Gas in 100 cu- 70 100 100	Silica	0.4329		1 0.0900
Carbonic Acid Gas in 100 cu-				
Carbonic Acid Gas in 100 cu-		91.4000	45.0417	30.0133
bic inches	bic inches	58	105	20
Temperature (Fahr.) Sprud. 165° Neub. 138° Mühl. 128° Ther. 122° 53°	Temperature (Fahr.)	Neub. 138° Mühl. 128°	53°	58°
	Analysed by		Berzelius	Struve.

RESOLVENT SPRINGS.

	Ragozi	Adel- heidsquelle	Elisen-	Congress	Kessel-
PULLNA.	of	of	of	Spring	brunnen
	KISSIN-	HEIL-	KREUZ-	of	of
	GEN.	BRUNNEN.	NACH.	SARATOGA.	EMS.
		5.2443		0.8261	8.0625
		0.0902			0.0405
` <u> </u>		0.0024			0.0022
·	0.0592	0.0387		0.0672	0.0080
0.5775	4.8180	0.4703	0.2058	5.8531	0.855
4.8045	1.3185	0.2980	1.1812	4.1155	0.5913
	0.0121	0.0012	0.0072	0.0202	0.0028
	0.1397	0.0121	0.1495	0.0173	0.0120
0.0026					
			l		0.001
3.6000	1.2540	0.0066		0.1379	0.405
92,8500					
1.9500	5.5485		<u> </u>		
		<u> </u>			
69 8145			1		
•				0.1004	
•	0.0364			0,0326	
		0.1845	0.7287	1.6256	0.033
•	39.3733	28.4608	54.6917	19.6653	5,725
			0.0562		
			9.7358	1	
• 14.7495	3.6599				
			0.2366		
			0.5494		
	0.3331	0.3060	0.2304	0,1613	
		0.1500	0.0024	0.0046	i
	'				0.001
		0.0166	0.0086	0.0069	
0.1320	0.1609	0.1922	0.2355	0.1112	0.310
188.4806	56.7136	35,4739	68.0190	32,7452	16.052
	1		12	114	51
7	96	10	12	114	91
	m 000	r.00	450	500	11=0
. 580	53°	58°	47°	50°	117°
. Struve.	Struve.	Struve.	Struve.	Schweitzer	Struve
. Struve.	Strave.	Strave.	Strave.	Schwenzer	Struve

First Class.—RESOLVENT SPRINGS.

GRAINS OF ANHYDROUS Ingredients in ONE POUND TROY.	Grande Grille of VICHY.	Obersalz- brunnen of SILESIA.	seltzer.
Carbonate of Soda	21.9058	7.6211	4.6162
Ditto of Ammonia	0.0277	i	i
Ditto of Lithia			
Ditto of Baryta	-	i	0.0014
Ditto of Strontia	0.0134	0.0170	0.0144
Ditto of Lime	1.4441	1.5464	1.4004
Ditto of Magnesia	0.2036	1.5496	1.5000
Ditto (Proto) of Manganese	0.0028	0.0026	
Ditto (Proto) of Iron	0.0072	0.0356	
Sub-Phosphate of Lime	0.0026		0.0007
Ditto of Alumina			0.0020
Ditto of Magnesia	0.0189		
Sulphate of Potassa	1.1760	0.3160	0.2978
Ditto of Soda	0.6780	2.5106	
Ditto of Lithia			
Ditto of Lime			
Ditto of Strontia			
Ditto of Magnesia			
Chloride of Ammonium		0.0164	
Ditto of Potassium			0.2685
Ditto of Sodium	3.3338	0.8682	12 9690
Ditto of Magnesium			
Bromide of Sodium	0.0007	0.0051	
lodide of Sodium	0.0002		
Fluoride of Calcium			0.0013
Allumina	0.0049		
Silica	0.3696	0.2423	0.2265
Total	29.1893	14.7309	21.2982
Carbonic Acid Gas in 100 cu- bic inches	49	98	126
Temperature (Fahr.)	108°	58°	58°
Analysed by	Struve.	Struve.	Struve.

			Second Class.—TONIC SPRINGS.			
	FACHIN- GEN.	GEILNAU	PYR- MONT.	Pouhon of SPA.	Ferdinands- brunnen of AUSCHO- WITZ.	Franzens- brunnen of EGER.
	12.3328,	4.9658		0.5531	4.5976	3.8914
٠.						
					0.0507	0.0282
٠.						
••					0.0040	0.0023
••	1.8667		4.7781	0.7387	3.0085	1.3501
٠.	1.2983	1.6282	0.0000	0.8421	2 2867	0.5040
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